PRECLINICAL STUDY OF SIDDHA DRUG MANDOORA VADAGAM'S HAEMATINIC, HEPATOPROTECTIVE AND ANTI-OXIDANT ACTIVITIES

Dissertation submitted to

THE TAMILNADU DR. MGR MEDICAL UNIVERSITY

CHENNAI-600032

In partial fulfilment of the requirements

for the award of the degree of

DOCTOR OF MEDICINE (SIDDHA)

BRANCH-II-GUNAPADAM

POST GRADUATE DEPARTMENT OF GUNAPADAM

THE GOVERNMENT SIDDHA MEDICAL COLLEGE

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GOVT. SIDDHA MEDICAL COLLEGE
PALAYAMKOTTAI

DECLARATION BY THE CANDIDATE

I hereby declare that this dissertation entitled **"Pre clinical study of herbo mineral drug *MANDOORA VADAGAM* for its haematinic, hepatoprotective and anti-oxidant activities"** is a bonafide and genuine research work carried out by me under the guidance of **Dr. G. Essakky Pandian M.D(s)., Lecturer,** Post Graduate Department of *Gunapadam*, Govt. Siddha Medical College, Palayamkottai and the dissertation has not formed the basis for the award of any Degree, Diploma, Fellowship or other similar title.

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ABBREVIATIONS

MV	-	MANDOORA VADAGAM
CPCSEA	-	Committee for the purpose of control and supervision of experimental animals.
DC	-	Differential Count
ESR	-	Erythrocyte Sedimentation Rate
FTIR	-	Fourier transform infrared spectroscopy
Hb	-	Haemoglobin
IAEC	-	Institutional Animal Ethical Committee.
ICP-OES	-	Inductively coupled plasma optical emission spectrometry
Ig E	-	Immunoglobulin E
LDH	-	Lactate Dehydrogenase
MCV	-	Mean Corpuscular Volume
OECD	-	Organisation for Economic Co-operation and Development
PCV	-	Packed Cell Volume.
PGE	-	Prostaglandin E
RBC	-	Red Blood Corpuscles
SEM	-	Scanning electron microscope
CCD_S	-	Charge coupled devices.
SPME	-	Solid phase micro extraction
TCD	-	Thermal conductivity detector
FID	-	Flame Ionization detector
CCD	-	Catalytic combustion detector
LD	-	Low dose
Mg		Milligram
Kg		Kilogram
LD_{50}		Lethal Dose $_{50}$
p.o		peros
ML		Milliliter
%		percentage
R&D		Research and Development

EDTA	Ethylene Diamine Tetra Acetic Acid
M	Male
g%	Gram percentage
g	Gram
NOAEL	No-Observed-Adverse-Effect-Level
MLD	Minimum Lethal Dose
MTD	Maximum Tolerated Dose
PKS	Pandu Kamalai Sikichai

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This certificate is awarded to Dr/~~Mr/Mrs~~.....D. NANDHINI.....

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Title of the Project : *Mandura vadagam* for its haematinic , hepatoprptective, anti oxidant activities

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CERTIFICATE OF BOTANICAL AUTHENTICITY

Certified that the following herbal drugs used in the Siddha formulation ***MANDURA VADAGAM*** internal for the management of ***PAANDU*** taken up for the post graduate dissertation study by **Dr.D.NANDHINI,M.D(s)** (Reg.No : 321612005) P.G Department of *Gunapadam* are correctly identified and authenticated through Visual inspection /Experience, Education and training / Organoleptic character / morphology / taxonomical / microscopic method.

TAMIL NAME	BOTANICAL NAME	FAMILY	PART USED
MARAMANJAL	*Coscinium fenestratum,Colebr.*	Menispermeaceae	Wood
CHUKKU	*Zingiber officinale,Roscoe.*	Zingiberaceae	Rhizome
CHEVIYAM	*Piper nigrum,Linn.*	Piperaceae	Root
THESAVARAM	*Piper longum,Linn.*	Piperaceae	Root
DEVADARU	*Cedrus deodara,(Roxb)Loud.*	Pinaceae	Wood
PERUNGAYAM	*Ferula asafoetida,Regel.*	Umbelliferae	Gum resin
KARUNJEERAGAM	*Nigella sativa,Linn.*	Ranunculaceae	Seeds
THIPPILI	*Piper longum,Linn.*	Piperaceae	Fruit
KADUKKAI	*Terminalia chebula,Retz.*	Combretaceae	Fruit skin
MILAGU	*Piper nigrum,Linn.*	Piperaceae	Fruit
OMAM	*Carum copticum,Linn.*	Umbelliferae	Fruit
SEERAGAM	*Cuminum cymium,Linn.*	Umbelliferae	Seeds
MANJAL	*Curcuma longa,Linn.*	Zingiberaceae	Rhizome

Date : 4-7-2018
Station: Palayamkottai.

Authorised Signature

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TAMIL NAME	ENGLISH NAME	CHEMICAL NAME
INDHUPPU	ROCK SALT	SODIUM CHLORIDE IMPURA
MANDURAM	IRON RUST IMPURE OF IRON	FERROSO FERRIC OXIDE

Date : 4.7.2018

Station: Palayamkottai.

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1. INTRODUCTION

Siddha system of medicine is one among the ancient science which is profounder and practiced by eminent spiritual scientists called siddhars.

Man is said to be the microms and the universe is microms because what exists in the universe exists in man to man is nothing but the miniature of universe containing the five elements and the various principles which constitute the vegetables and animal kingdom.

Siddhars further realized that if the body could only be made strong and perfect they could get rid of birth and death and live for ages together.

Our unique system of tamil medicine is based upon two main theories viz. The panchaboutha theory and mukkutram theory.

The universe is formed by 5 elements namely earth, water, fire, air, space which are called pancha boutha and every living organisms is formed of it in definite proportion. This is explained as,

"நிலம் நீர் தீவளி விசும்போடைந்தும்
கலந்த மயக்க உலகமாதலின்"

-தொல்காப்பியம்

In siddha system of medicine a close relation is maintained between human and universe whatever changes occur in the prabancham influence the human body also. It has been illustrated as

அண்டத்தில் உள்ளதே பிண்டம்
பிண்டத்தில் உள்ளதே அண்டம்
அண்டமும் பிண்டமும் ஒன்றே
அறிந்து தான் பார்க்கும் போதே.

The knowledge of trithosa is essential and indispensable to a siddha physician in the diagnosis and treatment of disease. Trithosa when in equilibrium keep the body in homeostasis but when vitiated either single or in combination bring about disease.

"மிகினும் குறையினும் நோய் செய்யும் நூலோர்
வளி முதலா எண்ணிய மூன்று"

The three vital humours circulate in the body in different proportions help in the digestion of foods and maintain the vitality of the body. When there is derangement in the ratio of vital humours it will disturb the normal condition of the body.

Anaemia in Siddha System:

In siddha system of medicine. Siddhar told that the human beings are affected by 4448 diseases. In it Paandu is a more prevalent disease which affect the people in all age groups.

In the text book "*Noi Nadal Noi Mudal Nadal"* authored by Dr.M.Shanmugavel, HPIM. It is explained that the symptoms of Paandu are *udalveluthal* (Pallor skin), *siru tholaivu nadakinum kaal ointhupothal* (Fatigue during walking), *perumoochu* (Dyspnoea), *thalaisutral* (Dizziness), *marbuthudithal* (Palpitation), *udalelaithal* (Weight loss).

In modern science, anaemia may be defined as a decrease in the total amount of red blood cells or hemoglobin in the blood. The symptoms are pallor, dizziness, shortness of breath, palpitation, easily fatigue and loss of energy.

In modern science the symptoms of *Paandu* may be correlated with Anaemia. In the literature of *SARABENTHIRA VAITHIYA MURAIGAL(pandu kamalai sikichai)* published by K.Vasudeva sasthri, S.Venkattarajan there is a preparation called *Mandoora vadagam* which is exclusively indicated for anaemia in which its efficacy has to be scientifically evaluated.

Globally anaemia affects 1.62 billion people(95%) which corresponds to 24.8% of the population. The highest prevalence in pre-school children47.5% and the lowest prevalence in men(12.7%). However the population group with the greatest number of individuals affected in non-pregnant women(468.8million).Iron deficiency anaemia affects nearly one million people. In 2013 anaemia due to iron deficiency resulted in about 183000 deaths down from 213000 in 1990.It is more common in females than males, among children, during pregnancy and in the elderly.

Most Anaemia patients can be treated orally by dried ferrous sulphate given as tablet. The adverse effects of these drugs are epigastric pain, heart burn, nausea, vomiting, staining of teeth, metallic taste, constipation is more than diarrhoea. However,these may be caused by alteration of Intestinal flora.

Anaemia adversely affects a child's mental & physical development .An unbalanced diet is the primary cause of anaemia. So control of anaemia in young children and adolescent is necessary to improve the quality of life of youngsters. So I have selected this topic.The more scientific approach to all aspects of life even before thousands of years should be appreciated and bring into our day today life. I take this opportunity to study the disease Anaemia.

Hence I have selected the medicine "***MANDOORA VADAGAM***" in the Literature Of "***SARABENTHIRA VAITHIYA MURAIGAL*****" *(pandu kamalai sikichai)* published by K.Vasudeva sasthri, S.Venkattarajan (page no58)** which is exclusively indicated for **"*PAANDU*"** and its efficacy has to be scientifically evaluated.

2. AIM AND OBJECTIVE

AIM:

To Evaluate the HAEMATINIC, HEPATOPROTECTIVE and ANTIOXIDANT Activity Of *MANDOORA VADAGAM* by invivo methods.

In our *siddha* system metals and minerals theory was introduced by our *siddhars* which is easy to preserve smaller in dosage and longer in self life.

Mandoora vadagam is essential to find out a simple drug to overcome anaemia. The drug should be easily available, affordable price, easily administrated and also effective in smaller doses. So, the author has selected this drug for the dissertation purpose.

OBJECTIVES:

The main objective of the present study is to highlight the safety and efficacy of *"Mandoora vadagam* " on *Paandu Noi*. The following methodology was adopted to evaluate the drugs and its standardization studies.

1. To collect the literature evidence regarding the trial medicine.
2. Identification of the raw drugs in the *MANDOORA VADAGAM*
3. To prepare the trial medicine as per the text.
4. Physico-chemical analysis of trial drug.
5. Evaluation of the toxicity of trial drug.
6. Evaluation of Haematinic activity of trial drug.
7. Evaluation of Hepato protective activity of trial drug.
8. Evaluation of Anti Oxidant activity of trial drug.

3.REVIEW OF LITERATURE

3.1. *DRIED GINGER* (சுக்கு)

3.1.1 *GUNAPADAM ASPECT*

Synonyms:

Arukkan, Athagam, Aarthragam, Ubagullam, Ularntha inji, Kadupathira, Chukku, Sundi, Sowpannam, Navasuru, Nagaram, Manavushatham, Vichvabeshjam, Vidamoodiya amirtham, Verkombu .

Vernacular Names:

Eng	-	Dried Ginger
Tel	-	Sonti
Mal	-	Chukku
Kan	-	Ona Shunti or Sunti
Sans	-	Nagaram
Hind	-	Sonth
Arab & per	-	Znagebilarataba

Parts Used : Underground (Rhizome)

Organoleptic character:

Taste	-	Pungent
Potency	-	Hot
Biotransformation	**-**	Pungent

Actions:

Stomachic, Carminative, Stimulant

General Characters:

"சூலை மந்தம் நெஞ்செரிப்பு தோடமேப் பம்மழலை
மூலம் இரைப்பிருமல் மூக்குநீர் வாலகப
தோடமதரி தொடர்வாத குன்மநீர்த்
தோடம்ஆ மம்போக்குஞ் சுக்கு" - (அகஸ்தியர் குணவாகடம்)

It cures Indigestion, Heart burn, Anal Diseases, Bronchial Asthma, *Kaasam*, Sinusitis, *Vadha Gunmam*.

It cures abdominal distension, ear pain, *Vaadha* diseases, Facial Diseases, Head diseases, Dysentry, Anaemia, *Kabha Seetha suram*.

Medicine preparations:

Chukku kudineer:

"சுக்கு கடுக்காய் நிலவேம்பு சுகமாய் வேப்பந் தோல்சீந்தில்
கைக்கும் புடலம் பொடியதுவுங் கதிக்கு மொவ்வொன்றோர் கழஞ்சு
யொக்க நறுக்கி யிருநாழி யுழக்காய் - காய்ச்சிக் குடிப்பீரேல்
தக்க விடமுஞ் சுரம் பலவுஞ் தான்விட்டோடுந் தப்பாதே"

- அகஸ்தியர் குணவாகடம்

1. *Chukku, kadukkai, Nilavembu, Vepanthol, Seenthil, Peipudall*
2. Above all & take each 1 *Kalanju* make the kudineer it cures Toxic fever.
3. *Chukku* powder and cow's milk mixed together and drink for proper appetite.
4. *Chukku* is also chewed for tooth ache.
5. Small piece of *chukku* is inserted in the ear it cures ear pain, *Kabha* diseases.
6. *Chukku* is dried and applied for joint pain.
7. *ChukkuKudineer* 80 ml is drinked daily for 2 (or) 3 times it cures stomach pain, vomiting, indigestion, abdominal distension.
8. *Chukku* is chewed to cure Throat pain and sore throat.

Other medicine preparations :

Amukkara chooranam*:*

Dose : 2gm

Indications : *Paandu*(Anaemia)*, Iraipu(*Asthma) *Gunmam (*Gastric ulcer)*,Vikkal.*

- *Siddha Vaidhya Thirattu, Pg.No:213*

Thalisathi chooranam:

Dose : 2gm

Indications : *Kamalai, Suram, Gunmam.*

- *Siddha Vaidhya Thirattu, Pg.No:227*

Gandhaga vadagam:

Dose : 130mg

Indications : *Paandu, sobai, Moolakirani.*

- *Siddha Vaidhya Thirattu, Pg.No:230*

Inji kuzhambu:

Dose : 4ml

Indications : *Paandu, Erumal.*

- Sarabenthirar Vaidhya Muraigal – P.K.S.,Pg.No:2

Venkara mathirai:

Dose : *siruthetran vithai*

Indications : G*unmam, Vatham, Paandu, Soolai, Magotharam*

- *Siddha Vaidhya Thirattu,Pg.No:45*

3.1.2 BOTANICAL ASPECT

Botanical name :

Zingiber officinale.*Linn*

Taxonomical Classification:

Kingdom	-	Vegetable Kingdom
Division	-	Spermatophyta
Sub-Division	-	Angiospermae
Class	-	Monocotyledonae
Series	-	Epigynae
Family	-	Scitominae
Sub-Family	-	Zingiberaceae
Genus	-	*Zingiber*
Species	-	*Officinale*

Distribution:

Widely cultivated in tropical Asia. Ginger is cultivated in many parts of India, and on large scale in the warm, moist regions, chiefly in madras, cochin and Travancore, and to a some what less extent in Bengal and the Punjab.

Botanical Description:

It is an underground rhizome.

Habit:

A herbaceous, rhizomatous perennial, reaching up to 90cm in height under cultivation.

Root: Adventitious

Leaves:

Narrow, distichous, Sub-sessile, linear – lanceolate, 17.0cm x 1.8 cm, dark green, evenly narrowed to form slender tip with stem – clasping sheaths.

Chemical Compositions:

The composition of ginger varies according to the type and the agroclimatic conditions under it is grown.

Gigerols, Shogoals, Zingerone, Volatile Oils that give its characteristic odour and flavor these oils have been known to increase GIT motility in laboratory animal and also have analgesic, anti pyretic activities.

3.1.3.LATERAL RESEARCH WORK:

Ginger supplementary therapy for iron absorption in iron deficiency anaemia.

The study was aimed to establish ginger as a supplement in treatment of anaemia along with iron supplements sixty two patients aged between 18-55 yrs, suffering from anaemia participated in the study.Blood sample was analyzed for hematological and iron related parameters before and after treatment. Hematological parameters and iron related parameters – plasma iron and plasma ferritin show increased and tibc decreased by treatment in all the group patients. Percent rise in hematological and iron related parameters, was calculated which indicates that the ginger and iron supplementation was found to be effective in correcting anaemia and iron deficiency . It was concluded that ginger assist in iron absorption and found to be beneficial as a supplement in therapy of anaemia.

Journal Name: Indian journal of traditional knowledge, Jan 2012.

Author Name: Rashmi Kulkarni

3.2. *BLACK PEPPER* - மிளகு

3.2.1. GUNAPADAM ASPECT

Synonyms :

Kalinai, kaari, kayam, kolagam, thirangal, meeriyal, saruabantham, valisam, masam, gurumilagu, malayali.

Vernacular names:

Tamil	-	*Milagu*
English	-	Pepper (Black)
Telugu	-	Miriyalu
Malayalam	-	Kurumilagu
Kannadam	-	Menasu
Sanskrit	-	Maricha
Hindhi	-	Kali mirch
Persian	-	Filfliaisiah

Part Used : Fruit, Root.

Organoleptic Character:

Taste	**:**	Bitter , Pungent
Potency	**:**	Hot Potency
Bio – Transformation	**:**	Pungent

Actions :

Acrid, Carminative, Antiperiodic, Antivatha, Antidote, Resolvent.

General Properties :

"சீதசுரம் பாண்டு சிலேத்மங் கிராணிமூலம்
வாதம் அருசிபித்தம் மாமூலம் ஓதுசன்னி
யாசம் அபஸ்மாரம் அடன்மேகம் காசம் இவை
நாசம் கறிமிளகி னால்" - அகத்தியர் குணவாகடம்

It relieves the Malarial Fever, Anaemia, diarrhoea, piles, peptic ulcer, Flatulance, Anorexia, cough, hemeplegia, vaginal disease, Neck and Nasal disorders, Jaundice, *pitham, vatham, vadhasonitha Noi*, and *Sann*i.

Medicinal uses of *Piper nigrum*:

1. The dry ripe powder of *Milagu* along with the honey is given to treat gastritis, Indigestion and stimulate appetite.
2. Its decoction is good remedy for fever and cough.
3. Medicated oil is prepared form *Piper nigrum* according to reference of *Theraiyar* literature for heaviness in head and ear problems.
4. Black pepper medicated oil according to reference of Materia medica BPM oil is used for *Paandu*, dropsy, Headache.
5. The fruits are used a aromatic, stimulant, stomachic and carminative, It causes feeling of warmth and uses as condiment. It also stimulates taste buds with increase in gastric juice. The oil is mainly used as spice due to pungent taste. It is reported to enhance the bio- availability of certain drug.
6. Black pepper causes the digestion process by secreting HCl as an alter before food consumption and hence, help in the prevention of diseases related to the intestine and the stomach.
7. Black pepper helps in treating diseases caused due to bacteria. The influence of black pepper has been observed while treating conditions like constipation, diarrhoea .

Medicine preparations:

Kaanthadhi mandoora chendhooram

Dose : *2 panavedai (976 mg)*

Indication : Magodharam, sogai, pitha paandu,kaamalai

- Sarabendhrar Vaidhya Muraigal – P.K.S., Pg.No :30

Kanthaga Vadagam :

Dose : *Kundrimaniyalavu (130 mg)*

Indication : *Paandu, Moolaikiran*

- *Siddha Vaidhya Thirattu, Pg.No:230*

Ayasambera Karpam

Dose : *1 pilavu*

Indication : *Paandu, Sobai*

- *Siddha Vaidhya Thirattu, Pg.No:232*

Inji Kuzhambu

Dose : *1 Karandiyalavu (4ml)*

Indication : *Arosagam, Paandu*

- *Sarabendhrar Vaidhya Muraigal – P.K.S., Pg.No :5*

Thirigadugadhi Mandooram

Dose *:* *Ilandhaikottai alavi (790 mg)*

Indication : *Paandu, Kaamalai, Shayam, Suram*

- Gunapadam Thadhu – Jeevam,Pg.No:200

3.2.2.BOTANICAL ASPECT

Botanical name:

Piper nigrum.lin

Taxonomical Classification:

Kingdom	:	*Plantae*
Subkingdom	:	Tracheobita
Superdivision	:	Spermatophyta
Division	:	Magnoliophyta
Class	:	Magnoliopsida
Subclass	:	Magnoliidae
Order	:	Piperales
Family	:	Piperaceae
Genus	:	*Piper*
Species	:	*nigrum*

Description :

A climber that grows to a height or length of 10 m or more. Once the main stem is established it grows many side shoots to create a bushy column. The plants form short roots, called adventitious roots, which connect to surrounding supports.

Leaves:

Almond-shaped, tapering towards the tip, dark green and shiny above, pale green below, arranged alternately on the stems.

Fruits:

Round, berry-like, up to 6 mm in diameter, green at first but turning red as they ripen, each containing a single seed. 50–60 fruits are borne on each spike.

Fruits are picked when green and immature to produce green pepper; when fully grown but still green and shiny to produce black pepper; and when slightly ripen to produce white pepper (for which the fruits are also soaked to remove the fleshy outer layer).

Constituents :

Chavicine, Piperine, Piperitine, Pipercide, Ispchavinic acid, methyl caffeic acid, Pipericide, a and B - cis - bergamoteme, guinensine, N-d transferlotyramine, N-5-(4 hydroxy - phenyl) 2E, 4E, pentadienoyl, Piperidine, N-isobutyl - 2E, 4E, 8Z Licostanatrienamide.

3.2.3.LATERAL RESEARCH WORK:

Antioxidant efficacy of black pepper (*piper nigrum* L.) and piperine in rats with high fat diet induced oxidative stress.

The present study was aimed to explore the effect of black pepper (piper niggrum.L).on tissue lipid peroxidation ,enzymic and non enzymic antioxidants in rats fed a high fat diet.Thirty male wister rats (95-115g) were divided into 5 groups.They were fed standard pellet diet, high fatdiet (20% coconut oil,2%cholestrol and 0.125% bile salts),high fat diet plus black pepper(0.25g or 0.5 g/kg body weight).high fat diet plus piperine (0.02 g/kg body weight)for a period of 10 weeks significantly elevated levels of thiobarbituric acid reactive substances(TBARS),conjugated dienes (CD) and significantly lowered activities of superoxide dismutase (SOD), catalase(CAT), glutathione peroxidase (GPx),glutathione (GSH),in the liver,heart,kidney,intestine and aorta were observed in rats fed the hig fat diet as compared to the control rats. Simultaneous supplementation with black pepper (or) piperine lowered TBARS and CD levels and maintained SOD ,CAT,GPx, GST,and GSH levels to near those of control rats.The data indicate that supplementation with black pepper or the active principle of black pepper ,piperine can reduces high fat diet induced oxidative stress to the cells.

Journal Name : Tand7Online.com

Author Name : R.S.Vijayakumar, D.Surya,

N. Nalini -2004

3.3. *LONG PEPPER* - திப்பிலி

3.3.1.GUNAPADAM ASPECT

Synonyms:

Aarkathi, Unsaram, Kaman, Kudari, Kolaiyaruki, Soundi, Ganam, Pipili, Vaideki, Aathimarunthum, Ambu, Koli, Saram, Kolagam, Saram, Saadi, Thulavi, Maagathi.

Vernacular Names :

Tamil	-	*Thippili*
English	-	Long Pepper
Telugu	-	Pippilu
Malayalam	-	Thippili
Kannadam	-	Hippili
Sanskrit	-	Pippali
Arabian and Persian	-	Daraife -fil

Part Used : Fruit (Dried)

Organoleptic character :

Taste : *Inippu* , *Karrpu*

Potency : Hot

Actions :

Stimulant, Carminative.

General Properties :

இருமல் குன்மம் இரைப்பு கயப்பிணி ஈளை பாண்டு சந்யாசம் அரோசகம்
பொருமல் ஊரை சிரிப்பிணி மூர்ச்சை நோய் பூரிக்குஞ்சல் தோடல் பீலிகமும்
வரும லப்பெருக்கோடு மகோதரம் வாதம் ஆதிமுத் தோடஞ் சுரங்குளிர்
பெருமாலைப்பரி மேகப் பிடகமும் பேருத் திப்பிலிப் பேரங்குரைக்கவே

-தேரையர் குணவாகடம்

1. Unripped fruit of *Thippili* neutralize *pitham*.
2. Dried variety of *Thippli* cures cough, ulcer, asthma, anaemia and headache, splenomegaly and throat infection and spermatogenetic properties.
3. Unripped fruit of *Thippili* cures severe *Kabha*, disease and gives strengthen to the body.

Traditional uses of *Piper longum*:

1. *Thippili* powder added with honey to take one month for Tinea versicolor infection.
2. *Thippili* and *Wedellia chinensis* decoction sediment with sugar for cough
3. *Thippili* and *thetran* powder used for leucorrhoea and menorrhoea.
4. *Terminalia chebula* and *thippili* powder with honey mix it and take rounded form for Dyspnoea.
5. *Thippili* powder with betel leaf juice with honey for expectoration, cough and fever.

Medicine Preparations:

Inji Kuzhambu :

Dose : *1 Karandiyalavu (4ml)*

Indication : *Arosagam, Paandu*

- *Sarabendhrar Vaidhya Muraigal – P.K.S., Pg.No :5*

Kanthaga Vadagam :

Dose : *Kundrimaniyalavu (130 mg)*

Indication : *Paandu, Moolakirani.*

- *Siddha Vaidhya Thirattu, Pg.No :230*

Amukkura chooranam:

Dose : 5gms

Indication : *Vikkal, Paandu, Ilaipu, Iraipu, Gunmam.*

- *Siddha Vaidhya Thirattu, Pg.No:211*

Loga Mandoora chenduram:

Dose : *Oru Kunri* (130 mg)

Indication : *Paandu, Sobai, Kamalai*, Ascities.

- *Gunapadam Thadhu – Jeeva Vaguppu, Pg.No :196*

Thirigadugadhi Mandooram:

Dose : *Ilandhaikottai alavu* (790 mg)

Indication : *Paandu, Kaamalai, Sobai*

-Gunapadam Thadhu – Jeeva Vaguppu, Pg.No:200

3.3.2. BOTANICAL ASPECT

Botanical name:

Piper longum.Linn

Taxonomical classification:

Kingdom	-	Plantea
Division	-	Tracheophyta
Subdivision	-	Apermatophytina
Infradivision	-	Angiospermae
Class	-	Magnoliopsida
Superorder	-	Magnolianae
Order	-	Piperales
Family	-	Piperaceae
Genus	-	Piper
Species	-	Longum

Biological source:

It consists of dried ripe or unripe fruits of *Piper longum*.

Geographical source:

It is a native of Bengal and Phillipines and found in hotter parts of India, Ceylon and Malaya wild or cultivated.

Leaves:

They are dark in colour, ovate (or) heart shaped, they are about 2 to 3 inches in length.

Flowers:

The plant bears flowers during rainy season male & female flowers. Both are bron on different plants.

Fruits:

Fruits are ovoid in shape. Orange & Yellowish in colour, and they grow in early winters, drupes are about 1 inch in diameter.

Spikes:

Once when ripened, spikes turn red in colour.

Root: Perennial woody root.

Chemical Constituents:

B- Caryophyllene, piperine, pipernonaline, piperundecalidine, piperlatine, sesamine, dihydrostitrastrco, piplasterol and futoamide.

It contains 1 percent volatile oil resin, alkaloids, piperine and piperlonguminine an waxy alkaloid N-isobutyl trans2, 4- decadienamide, sesamin a lignin derivative and terpenoid substance.

3.3.3.LATERAL RESEARCH WORK:

Hepotoprotective acitivity of *piper longum* traditional milk extract on carbon tetra chloride(CCL4) induced liver toxicity in Wistar rats.

Piper longum linn.(piperaceae)(fruits and roots powder)is given with boiled milk in the Indian traditional system of medicine for the treatement of liver aliments and jaundice.however ,the biochemical basis and mechanism of hepatoprotective action of piper longum milk extract is not scientifically studied. Thus, the present study wa designed to investigate the hepatoprotective activity of piper longum milk extract.carbon tetrachloride (CCL4)was used as a hepatotoxin at a dose of 0.5ml/kg p.o with olive oil (1:1) thrice a week for 21days to produce the chronic reversible type of liver necrosis.following treatment with *piper longum* milk extract (200mg/day p.o for 21 days),a significant hepatoprotective effect from decreased level of serum enzymes,total bilirubin and direct bilirubin .the hepatoprotective effect of piper longum is comparable to the standard drug silymarin(25 mg/kg p.o for 21 days).

-Journal Name: Scholar.google.co.in, 2009

Author Name : J.A.Patel,US,Shah

3.4. *CHEBULIC MYROBALAN, INK NUT* - கடுக்காய்

3.4.1. GUNAPADAM ASPECT

Synonyms:

Acodum, Arabi, Abayan, Rasagi, Ammai. Kaayastha, Aviyan, Siva, Haimavathi, Divya, Shirayahi, Pathiyam, Sethanika, Boodham, Nanthiri, Vayadharam, Pisakavara, Vijayadevan, Pranatha, Jeevapriya, Varikkai, Abaranam, Jeevanika, Amudham, Anganam, Arithagi, Amaritham, Yemavadhi Iyavi, Amrutha, Sirudham, Avayatha, Devi, Pariyam, Sirottam, Prathya, Seya, Vayastha, Nochi, Rohini, Poothana, Jeya, Vanathurki, Jeevanathi, Anthen, Amalai.

General Character:

தாடை கழுத்தக்கி தாலு குறியிவிடப்
பீடை சிலிபதமுற் பேதிமுடம் - ஆடையெட்டாத்
தூலமிடி புண்வாத சோணிகா மாலையிரண்
டாலமிடி போம்வரிக்கா யால் - அகத்தியர் குணவாகடம்

Kadukkai relieves diseases of chin, neck, tongue, obesity, jaundice, plant poisons (*Thavara - Sangama Vidangal*)

Types of *Kadukkai*:

"ஆதி விசயன அரோகிணியோ டேபிருதிவி
தீதில் அமிர்தை சிவந்திமலை - மீதார்
திவிருத தீயபயன் செப்பலிவை யேழாம்
அரிதகியின் பேதம் அறி" - அகத்தியர் குணவாகடம்

Arogini Kadukkai, Prithvi Kadukkai, Amirtha Kadukkai, Sivanthi Kadukkai, Thiruviruthi Kadukkai, Abayan Kadukkai, Visayan Kadukkai.

Other 4 Types :

Karunkadukkai,Senkadukkai,Varikadukkai,Paalkadukkai.

Parts used : Bark ,Fruit (Pericarp)

Actions :

General	:	Stimulant, Antiseptic, Caustic, Diuretic, Febrifuge
Fruits	:	Laxative, Tonic, Stomachic, Purgative, Alterative
Bark	:	Cardiac tonic

Unique features :

It has all 5 tastes other than salt taste. Important taste is Astringnet, and it also has a sweet, sour, Bitter and pungent tastes. This is unique special features.Normally

Astringent, Bitter and pungent tastes transfers to pungent taste after biotransformation. But *Kadukkai* after bio-transformation changes to sweet taste. It is also a unique character.

Medicinal Uses :

1. "*Triphala*" form is an important medicine used for Anaemia, constipation.
2. Fruit is used for Jaundice obesity, polyurea, Anorexia, Cardiac disease, Haemorrhage, eye disease, cough, dysphoea, Ascites, Urinary disorders, Rejuvenator.
3. Fruit is used for Anorexia, constipation, abdominal disorder, pales, fever cardiac tonic, Rejuvenator.
4. Fruit is astringent .It is roasted and taken orally 3 times for a day for 1 week in cough.

Medicine preparations:

Rathadhi Kumari Parpam

Dosage **:** *4 panavedai (1.952 gm)*

Indications **:** *Paandu, Vandhi, Kazhichal*

- *Sarabendhrar vaidhya muraigal - P.K.S., pg.no:24*

Kadukkai nei

Dosage **:** *1 karandi*

Indications **:** *Paandu,Soolai,Sogai, uthrarogam*

- *Sarabendhrar vaidhya muraigal - P.K.S.,* pg.no:69

Kaandhadhi mandoora chendhooram

Dosage **:** *2 panavedai* (976 mg)

Indications **:** *Paandu, Sogai, kaamalai*

- *Sarabendhrar vaidhya muraigal - P.K.S.,* pg.no:30

Panchaparana chooranam

Dose **:** *Mooviralalavu (800 – 1000 mg)*

Indications **:** *Paandu, Ratha pitham, Swasakaasam*

- *Sarabendhrar vaidhya muraigal - P.K.S.,* pg.no:36

3.4.2.BOTANICAL ASPECT

Botanical name :

Terminalia Chebula.Linn

Taxonomical Classification :

Kingdom	-	Plant Kingdom
Division	-	Angiosperms
Class	-	Dicotyledons
Sub class	-	Polypetalae
Series	-	Calciflorae
Order	-	Myrtales
Family	-	Combretaceae
Genus	-	*Terminalia*
Species	-	*Chebula*

Habitat :

Throughout the greater part of India, Burma and Ceylon upto 5,000 ft in the outer Himalayan and upto 6,000 ft in Travancore

In India, it is found chiefly in deciduous forests and in areas of lite Rainfall, but occasionally also in slightly moist forests. It grow abundantly in North India.

Habit :

A moderate sized or large deciduous tree, attaining 25-30 m in height. Flowering during April to June and fruiting during January to March.

Macroscopic Description:.

Fruits :

Fruit is simple and drupaceous fruit. It is pendulous, 2 to 4 long and is mostly egg shaped, oblong or elongate, ellipsoidal 15 to 25 mm, wide at the broadest part.

The cross section of the dried fruit mainly shows two parts :

1. Pericarp
2. Seed

Pericarp :

Pericarp comprises of rind, which is composed of very thin and closely adhering skin or epicarp and the mesocarp, and a hard or stony endocarp. On account of presence of ridges and furrows on surface of the fruit, the thickness of rind,

(epicarp and mesocarp) varies from 2 mm to 4 mm at the furrows and 4 to 6 mm at the ridges.

Seed :

The seed has a thin brownish skin or test and the embryo within whitish.

Collection of fruits :

The fruits are to be collected in first half of January from the ground as soon as they have fallen or the matured fruits are to be collected during January to April by shaking the trees and then they are dried in shade and store.

Chemical constituents:

Terminalia chebula contains chebulin Mp.249 from flowers, a purgative glycoside of an anthraquinone derivative isolated and tannin terchebin from fruits.

3.4.3 LATERAL RESEARCH WORK :

Antioxidant effects of aqueous extract of *terminalia chebula* in vivo and in vitro .

The ripe fruit of *terminalia chebula* ,which is a native plant in india and southeast asia, has traditionally been used as a popular folk medicine for homeostatic,antitussive,laxative, diuretic, and cardiotonic treatments.the objective of this study was to evaluate the protective effects of an aqueos extract of fruit *T,.Chebula* on the tert-butyl hydroperoxide (t-BHP)-induced oxidative injury observed in cultured rat primary hepatocytes and rat liver.both treatment and pretreatment of the hepatocytes with the *T.Chebula* extract(TCE) significantly reversed the t-BHP-induced cell cytotoxicity and lactate dehydrogenase leakage. Inadditon ,TCE exhibited invitro ferric –reducing antioxidant activity and 2,2-diphenyl-1-picryhydrazl free radical scavenging activities.the in vivo study showed that pretreatment with TCE(500 OR 1000mg/kg)by gavage for 5 d before a single dose of t-BHP significantly lowered the serum levels of the hepatic enzyme markers aspartate aminotransferase and alanine aminotransferase and reduced the indicator s of oxidative stress in the liver, such as the glutathione disulfide content and lipid peroxidation,in a dose dependent manner.

-Journal Name : Biological and pharmaceutical Bulletin, 2005 September

Author Name : Hyuns Lee, Hee Won Nam

3.5. *HIMALAYAL CEDAR, DEODAR* - தேவதாரு

3.5.1. GUNAPADAM ASPECT

Synonyms

Devadarm , Thoon , Irudharu , Dharu, Tharam, Devasurar Maram , Pathiratharugam.

Vernacular names:

English	-	Himalayn cedar, deodar
Telugu	-	Davadaru
Malayalam	-	Thevatharam
Sans.	-	Devadaru
Hindi	-	Deodar
Kan	-	Devadari

Parts used: Wood, Bark

Organoleptic characters:

Taste **:** Bitter , Astringent

Potency **:** Hot potency

Bio transformation **:** *Karpu*

Actions: Astringent, Febrifuge, Carminative.

General characters:

தேவதா ரக்குணந்தான் சேர்ந்துவளர் பீனிசத்தைக்
காவகத்தி லோட்டுங் கரப்பலவே – மாவலவர்
சொல்லும்பு ராண சுரமொடுநீ ரேற்றத்தை
வெல்லு மனற்றணிக்கு மெய் .

- அகத்தியர் குணவாகடம்

Types:

1. *Devadaru - cedrus deodara*
2. *Sarala devadaru- pinus longifolia roxb.*

Medicinal uses of devadaru:

1. Cedrus deodara is extremely useful in neurological disorders, asthma, pruritis, fever, infested wounds.
2. Deodar oil is also used in arthritis, headache,etc.

Medicine preparations:

Vilvadhi Legiyam:

Dose : *Kalarchi* (2.6 gm)

Indications **:** *Paandu* , Swasam, Shayam, Vaandhi

- *Sarabendhrar vaidhya muraigal - P.K.S.,* ,pg.no:47

Kadukkai nei :

Dose *: ½ thola* (5.8 gm)

Indications **:** *Paandu, Swasam, Shayam, Irumal*

- *Sarabendhrar vaidhya muraigal - P.K.S.,* pg.no:69

***Siddha Mandooram*:**

Dose **:** *Kazharchi alavu* (2.6 gm)

Indications **:** *Paandu, Sobai*

- *Gunapadam Thadhu – Jeeva vaguppu, Pg. No:200*

3.5.2. BOTANICAL ASPECT:

Botanical name:

Cedrus deodara.Linn

Taxonomical classification:

Kingdom	:	plantae
Division	:	pinophyta
Class	:	pinopsida
Order	:	pinnales
Genus	:	*cedrus*
Species	:	*c. deodara*

Description:

A tree upto 50 m high and upto 3m in diameter crown conical when young ,with drooping leader and branches drooping at the end. Older trees rounded. Branches horizontllly arranged, and end of the shoots pendulous. One year shoots densely pubescent.

Macroscopic character:

Needles blue green about 30 in a cluster,3-5 cm long, acuminate. Flowers appear in September and October. Cones solitary or in pairs.ovate or barrel shaped,7-10 cm long,5-6 cm wide,rounded at the apex,bluish when young ,reddish- brown when ripe,maturing from September to november,seed is shed from September to December, seed scales 5-6 cm wide,usually glabrous on the upperside,seed about 17 mm long,about 6mm wide,wing large,light brown.

Chemical constituents:

Bark - taxifolin

Wood - cedeodarin, cedrin, hydromyricetin

Needle - alpha terpineol(0.2%), linalool(24.47%) limonene(17.01%) eugenol (2.14%)

3.5.3 LATERAL RESEARCH WORK:

Free radical scavenging active components from *cedrus deodara*:

An activity directed fractionation and purification process was used to identify the antioxidants components of *cedrus deodara*. Dried heartwood powder of *c.deodara* was first defatted with petroleum ether and then extracted with chloroform. The chloroform extract showed strong antioxidant activity 1,1 diphenyl -2-picrylhydrazyl (DPPH) free radical.this fraction was then subjected to separation and purification using silica gel column chromatography. Three compounds with potent antioxidant activity were isolated in significant yields and identified by spectroscopic methodsHNMR,NMR,IR and MS. They were identified as (-)-matairesinol,(-)-nortrachelogin and a dibenzylbutyrolactolligan (4,4,9- trihydroxy-3,3-dimethoxy-9,9-epoxylignan).this is the first report of the occurrence of these compounds in *c.deodara*.

- Journal Name : Pubmed, 2001
  Author Name : Tiwari AK, et al.
  J Agric Food Chem

3.6. *BLACK PEPPER ROOT* - செவ்வியம்

3.6.1 GUNAPADAM ASPECT:

Synonyms:

Kandeerai, Savikai, Saviyam.

Vernacular names:

Eng	:	Black pepper
Tel	:	Miriyalu
Mal	:	Kurumulaku
Kan	:	Menasu
Sans	:	Maricha
Hindi	:	Kall-mirch
Pers	:	filfliaisiah

Parts Used : Root

Organoleptic Characters:

Taste	– Bitter, Pungent.
Potency	– Hot
Bio-transformation	– Pungent

Actions **:** Acrid, Carminative, Anti-periodic, Rubefacient, Stimulant, Resolvent, Anti-vatha.

General characters:

சூலை அருசிசன்னி தொல்லிருமல் ஈளைபித்தம்
மேலைக் குரற்கம்மல் வெங்கலநோய் - மூலசுரம்
குவ்வியங்கத் தேறி கனதா வரவிடமுஞ்
செவ்வியங் கொள்ள விடுந் தேர்.

- அகத்தியர் குணவாகடம்

It cures pain, aguesia, chronic cough, fever, throat pain, throat diseases, bone marrow diseases.

Therapeutic uses:

1. It cures snake bite poisoning.
2. 1-2 gram daily twice powder and decoction were given to cure above diseases.
3. *Chevuiyam* oil- it is used for rhinitis

Medicine preparations:

Vilvadhi Legiyam:

Dose : *Kalarchi* (2.6 gm)

Indications **:** *Paandu*, *Swasam, Shayam, Vaandhi*

- *Sarabendhrar vaidhya muraigal - P.K.S.,* pg.no:47

Mandoora Chooranam

Dose **:** *1 kalanchu* (5.12 gm)

Indication **:** *Paandu(* Anaemia), *Kamalai* (Jaundice), *Kaal veekkam*

- *Sarabendhrar vaidhya muraigal - P.K.S.,* pg.no:39

3.Karipanaadhi Legiyam

Dose : *Kottaipaakkalavu* (6.02 gm)

Indication **:** *Pitha Paandu,Kamalai, Gunmam, Pitham*

- *Sarabendhrar vaidhya muraigal - P.K.S.,* pg.no:52

4.Paagarkadukkai

Dose : *Oru thundu*

Indication : *Gunmam, Paandu, Vaayvu, Pitham*

-Siddha Vaidhya Thirattu, Pg.No:233

3.6.2.BOTANICAL ASPECT

Botanicl name :

Piper nigrum.Linn

Taxonomical classification:

Kingdom	:	*Plantae*
Subkingdom	:	Tracheobita
Superdivision	:	Spermatophyta
Division	:	Magnoliophyta
Class	:	Magnoliopsida
Subclass	:	Magnoliidae
Order	:	Piperales
Family	:	Piperaceae
Genus	:	*Piper*
Species	:	*nigrum*

Description :

A climber that grows to a height or length of 10 m or more. Once the main stem is established it grows many side shoots to create a bushy column.

The plants form short roots, called adventitious roots, which connect to surrounding supports.

Leaves:

Almond-shaped, tapering towards the tip, dark green and shiny above, paler green below, arranged alternately on the stems.

Flowers:

Borne in clusters along flowering stalks known as spikes. 50–150 whitish to yellow-green flowers are produced on a spike.

Fruits:

Round, berry-like, up to 6 mm in diameter, green at first but turning red as they ripen, each containing a single seed. 50–60 fruits are borne on each spike.

Fruits are picked when green and immature to produce green pepper; when fully grown but still green and shiny to produce black pepper; and when slightly ripen to produce white pepper (for which the fruits are also soaked to remove the fleshy outer layer).

Constituents :

Chavicine, Piperine, Piperitine, Pipercide, Ispchavinic acid, methyl caffeic acid, Pipericide, a and B - cis - bergamoteme, guineensine, N-d transferlotyramine, N-5 (4hydroxy - phenyl) 2$E, 4E, pentadienoyl, Piperidine, N-isobutyl - 2E, 4E, 8Z Licostanatrienamide.

3.6.3. LATERAL RESEARCH WORK

A review on therapeutic potential *of piper nigrum* l.(black pepper): the king of spices

Medicinal plants are very popular in different traditional systems of medicines due to their diverse pharmacological potentials and lesser side effects in biological systems. *piper nigrum* l.(family : piperaceae)is awell known spice considered as the 'king of spices' among various spices. It contains a pingent alkaloid "piperine" which is known to possess many pharmacological actions. Piperine increases bioavailability of many drugs and nutrients by inhibiting various metabolishing enzymes. *Piper nigrum L* and its active constituent "piperine" exhibits diverse pharamacological activities like antihypertensive, antiplatelet, antioxidant, antitumour, anti asthmatics, analgesic, anti inflammatory, anti diarrhoeal, antispasmodic, anti depressents, immunomodulatory, anticonvulsant, anti thyroids, anti bacterial, anti fungal, hepatoprotective, insecticidal,and larvicidal activities.

-Journal Name : Medicinal and Aromatic plants,
July 30, 2014
Author Name : Zoheir A Damanhouri,
Aftab Ahmad

3.7. *LONG PEPPER ROOT* – திப்பிலி மூலம்

3.7.1. GUNAPADAM ASPECT:

Synonyms :

Thippiliver, thanmoolam, narukuthippili, narukuveru, kiranthiver, thippilikattai, nadhikaranthai, kandanthippili, modiver

Vernacular names:

Tamil	:	Thippiliver
Eng	:	Long – Pepper root
Tel	:	Pippili mulam
Mal	:	Kattu thippili
San	:	Pipalee moola
Hindi	:	Felfelaimaya
Kan	:	Hippfli-beru

Parts Used: Root

Organoleptic characters:

Taste – Pungent

Potency – Hot

Bio-transformation – Pungent

Actions: Stomachic

GENERAL CHARACTERS:

தாகவித்தஞ் சோகந் தணியாச் சுரமிருமல்
மேகங் குரற்கம்மல் மெய்க் கடுப்பும் - ஏகுங்காண்
திப்பிலிமூ லங்கண்டத் திப்பிலிய தாம்நறுக்குத்
திப்பிலியென் றேயொருக்காற் செப்பு

- அகத்தியர் குணவாகடம்

It cures fever, cough, sore throat, Anaemia and *Kabha* diseases. It cures intestinal problems.

Therapeutic uses:

1. It breaks down *kabha*, useful in thick sputum, sinusitis and asthma.
2. It is useful in worm infestation, infected wounds.
3. It improves digestion strength. It increases *pitha* dhosa.
4. It cures ascities, enlargement of abdomen.
5. It relieves gas, fullness of abdomen, bloating, spleen disorders, splenomegaly, abdominal tumors.

Medicine preparations:

Dheepakkini chooranam:

Indications : *Paandu, kaamalai, ashta gunmam*

- *Anuboga Vaidhya Muraigal, Pg.No:115*

Vilvathi legium :

Dose : *Kalarchikai alavu*

Indications : *Paandu(* anaemia), *vikal(H*iccup), Pitham

- *Sarabendhrar Vaidhya Muraigal – P.K.S., Pg.No : 16*

Abipathyadhi chooranam:

Indications : *Adhisaram, Paandu, Magodharam*

- *Anuboga Vaidhya Muraigal, Pg.No:115*

Thirikadugadhi mandooram :

Dose : *Ilandhaikottaialavu (790 mg)*

Indications : *Paandu, Sobai,Kaamalai, Suram*

-Gunapadam Thadhu – Jeeva vaguppu, Pg.No:200

3.7.2. BOTANICAL ASPECT

THIPPILI MOOLAM

Botanical name :

Piper longum.Linn

Taxonomical classification:

Kingdom	-	Plantea
Division	-	Tracheophyta
Class	-	Magnoliopsida
Superorder	-	Magnolianae
Order	-	Piperales
Family	-	Piperaceae
Genus	-	*Piper*
Species	-	*Longum*

Distribution:

From central Himalayas to Assam, lower hills of Bengal, evergreen forests of western ghats from kontan to Travancore also cultivated in Afghanistan, srilanka, Pakistan, malaysia, and singapore.

Botanical description:

It is having slender, aromatic, perennial climber, with woody roots and numerous wide ovate, cordate leaves. The inflorescence is a cylindrical, pedunculate spike, the female flower is up to 2.5 cm long and 4-5 mm in diameter but the male flower is larger and slender. The fruits are small, ovoid berries, shiny blackish green, embedded in fleshy spikes.

Root :

Root is greyish brown in colour, longitudinally wrinkled and having roots and scars on the surface. It is stout, cylindrical, 0.2-0.6 cm thick, reddish brown to grey. It is aromatic and tastes pungent.

Leaves:

Leaves are simple, alternate, numerous ,3.7-8.7 cm long, lower ones broadly ovate, very cordate with broad rounded lobes at the base, all subacute, entire,

glabours, thin, bullate with reticulate venetation, sunk above nad raisied beneath, dark green and shining above, pale, and dull beneath , petioles of lower leaves 5-7.5 cm long.

Fruit:

Small ovoid, completely sunk in solid fleshy spike which is 2.5 -3.7 cm long, ovoid – oblong, erect blunt, blackish green and shining.

Chemical constituents:

Alkaloids piperine, piplartine, and piperlonguminine, sesamin, tri-methoxycinnamate.

3.7.3. LATERAL RESEARCH WORK:

Cultivation and pharmacological profiles of root of *piper longum linn*.

Several species of piper are used in indigenous system of medicine in india. The root of (*pippalimula)* and fruit (*pipali) of piper longum linn*. Is possessing high therapeutic virtues. According to ayurveda system of medicine, the *piper longum* linn. Roots are pungent and having heating, stomachic, laxative, anthelmintic, and carminative properties. It improves appetite and useful in bronchitis, abdominal pain, disease of the spleen, and tumous, according to unani system, root has a bitter hot and sharp taste and used as carminative, hepatoprotective, stomachic, abortificant, hematinic, diuretic, digestive and as ageneral tonic. It also cures inflammation of liver, pains in the joint, lumbago, snakebites, scorpion sting and night blindness. Plant *pipalli* is cultivated and also imported from other countries as it is highly demanded in pharmaceutical industries.

-Journal Name : Pharma science Monitor, January 2013

Author Name : K. Joshi, K.Panara

3.8. *BISHOP'S WEED* – ஓமம்

3.8.1. GUNAPADAM ASPECT:

SYNONYMS :

Thippiyam, Asamodhum,

VERNACULAR NAMES:

Tamil	:	Omum
Eng	:	The Bishop's weed
Tel	:	Omum
Mal	:	Omum, Ayamodakam
San	:	Yavani
Hindi	:	Ajvayan
Kan	:	Voma

Parts Used: Seed

Organoleptic characters:

Taste – Pungent

Potency – Hot

Bio-transformation – Pungent

Actions : Stomachic, Carminative, Anti spasmodic, Antiseptic, Stimulant, Tonic, Sialogogue.

General characters:

சீதசுரங் காசஞ் செரியாமந் தம்பொருமல்
பேதி யிரைச் சல்கடுப்பு பேராமம் - ஓதிருமல்
பல்லொடுபல் மூலம் பகமிவைநோ யென்செயுமோ?
சொல்லொடு போம் ஓமமெனச் சொல்

- அகத்தியர் குணவாகடம்

It cures indigestion, Flatulence, diarhroea, cholera, Bronchial asthma, dental diseases, cough etc.

Traditional uses:

The plant is used traditionally as a stimulant, for diarrhoea and abdominal discomfort.

Extremely beneficial foe ear ache, toothache, influenza, heart problems, arthritis, nasal blockage. Used to cure indigestion problems, cures fever and act as expectorant.

Medicine preparations:

Inji kuzhampu:

Dose : *Oru sirukarandiyalavu*

Indications : *Aarosagam*, *Paandu (* Anaemia*), Seriyamai, Irumal, Eelai, Veekkam*

- *Sarabendhrar Vaidhya Muraigal P.K.S., Pg.No : 5*

Vilvathi legium :

Dose : *Kalarchikai alavu* (2.688gm)

Indications : *Paandu(* anaemia), *vikal(H*iccup), Pitham

- *Sarabendhrar Vaidhya Muraigal – P.K.S., Pg.No : 16*

Karungoli chooranam:

Dose : *Thirigadi* (800 – 1000mg)

Indications : *Vaayu, Sogai, paandu, magodharam, ashta gunmam, neerkovai*

- *Anuboga Vaidhya Brahma Ragasiyam, Part 1,Pg.No:14*

Kittadhi chooranam :

Dose : *Mooviralalavu* (800 – 1000mg)

Indications : *paandu, kaamalai, veekkam*

- *Sarabendhrar Vaidhya Muraigal – P.K.S., Pg.No : 80*

Karipanadhi legiyam:

Dose : *Kottaipakkalavu* (6.022gm)

Indications : *Pitha paandu, kaamalai, Gunmam, pitham*

- *Sarabendhrar Vaidhya Muraigal – P.K.S., Pg.No : 52*

3.8.2. BOTANICAL ASPECT

Botanical name : *Carum copticum.linn*

Taxonomical classification:

Kingdom	-	Plant
Division	-	Angiosperm
Class	-	Eudicots
Subclass	-	Asterids
Order	-	Apiales
Family	-	Apiaceae
Genus	-	*Carum*
Species	-	*Copticum*

Habitate:

It is originated in the eastern medeterian , possibly Egypt and spread upto India from near east.

Habit : An annual erect, branched herb.

Flower :

Terminal, pedunculate, compound umbels.

Leaves:

2 – 3 pinnately divided segments linear.

Fruit:

Ovoid, pale brown resembling caraway and cumin. It has bitter and pungent taste with a flavour similar to arise oregano, cremocarp.

Chemical constituents:

Volatile oil – 3 to 4% with thimol, carvacrol, thymine, fixed oils and proteins are present.

Bergaptene is isolated from fruits.

A new galachoside 3 – galacto syloxy 5 hydroxy toluene is also present in seeds.

Active principles:

Essential oil contains thymol

Medicinal Uses:

Fruits are used as a household remedy for indigestion. Fruits are also much valued for there anti spasmodic, stimulant, tonic and carminative properties.

1. Effective in sore throat in bronchitis.
2. Best herbal for gas, flatulence.
3. It gives instant stomach pain relief.
4. It gives relief from anorexia.
5. Cures vomiting, mouth disease and piles.

Externally:

Paste of crushed fruits is applied for relieving colic pains and a heart burn and it is a common remedy for asthma.

Essential oil obtained from steam distillation of the fruit is medicinally important. The oil is reported to be useful as asthma, pneumonia and some other respiratory ailments.

3.8.3. LATERAL RESEARCH WORK:

Pharmacological profiles of *Carum copticum linn*.

The antihypertensive, antispasmodic, bronchodilator and hepatoprotective activities of the aqueous-methanolic extract of *Carum copticum* Benth. seeds (CSE) to rationalize some of its traditional uses. The dose of CSE was able to prevent the CCl_4-induced prolongation in pentobarbital-induced sleeping time in mice confirming its hepatoprotectivity. These results indicate the presence of calcium antagonist(s) in *Carum copticum* seeds and thus provides sound mechanistic basis for some of their folkloric uses. The ajowain (Carum copticum (L.)) is a popular spice and traditionally used in Indian system of medicine. Considering the importance of natural products in modern phytomedicine, the antioxidant and antimutagenic activities of C. copticum fruits extract and its fractions were evaluated. The methanol fraction showed highest antioxidant activity by phosphomolybdenum (2087.7 micromol) and DPPH assay (90.2%) followed by other fractions comparable to ascorbic acid and BHT. Based on antioxidant activity, methanol fraction was evaluated for antimutagenic potential against direct acting mutagens sodium azide (NaN(3)) and methyl methane sulphonate (MMS) and indirect acting mutagens 2-aminofluorene (2-AF) and benzo(a)pyrene (B(a)P), using Salmonella typhimurium (TA97a, TA98, TA100, and TA102) tester strains. The methanolic fraction showed no sign of mutagenicity at tested concentrations (25-100 microg/plate). Antimutagenic activity was recorded with inhibition of mutagenicity ranging from 10.8% to 83.1% in a concentration dependent manner. The phytochemical analysis by IR, HPLC, GC-MS, and total phenolic assay revealed a high content of phenolic terpenoids. Further, characterization of active principle is needed to understand the mechanism of action and therapeutic efficacy in vivo.

Journal Name : J Ethnopharmacol. 2005 Apr 8

Author Name : Gilani AH, Jabeen Q, Ghayur MN, Janbaz KH, Akhtar MS.

3.9. *CUMIN SEEDS* – சீரகம்

3.9.1. GUNAPADAM ASPECT

Synonyms

Asai, Seeri, Ubagumbapeesam, Narseeri, Thuthasaamalam, Pitha naasini, Bosana Kudori, Methiyam, Prithivika.

Vernacular names:

English	-	cumin
Telugu	-	jiraga
Marathi	-	Jiraghi
Gujarathi	-	jiru
Hindi	-	zira
Bengali	-	jira

Parts used: Fruits

Organoleptic characters:

Taste **:** Pungent, Sweet

Potency **:** Cool

Bio transformation : *Sweet*

Actions:

Stimulant, carminative, stomachic, anti spasmodic, anthelmintic, anti dyscentric, uterine tonic, anti pyretic , digestive, diuretic, galactogogue.

General characters:

It cures abdominal disorder,Liver disorder, renal calculi, asthma, vadha disorder, diarrhoea etc.

பித்தமெனு மந்திரியைப் பின்ன படுத்தியவன்
சத்துருவை யுந்துறந்து சாதித்து – மத்தனெனும்
ராசனையு மீவென்று நண்பைப் பலப்படுத்தி
போசனகு டாரிசெயும் போர்

- தேரன் வெண்பா

It helps to relieve indigestion problems and helps in digestion.

It cures ulcer , flatulence, worm infestation, diarrhoea, vadham etc. It increases appetite.

Medicine preparations:

Ingi kuzhambu:

Dose **:** *Oru sirukarandi*

Indications **:** *Arosagam, Irumal,Veekkam, Seriyamai, Eelai, Aruveruppu,Paandu* (Anaemia)

- *Sarabendhrar Vaidhya Muraigal – P.K.S., Pg.No : 5*

Vilvadhi legiyam :

Dose : *Kazharchikai alavu* (6.022gm)

Indications **:** *Vaayu gunmam, Paandu,Kapam, Visa rogam,Pitham.*

- *Sarabendhrar Vaidhya Muraigal – P.K.S.,Pg.No : 16*

***Sinjadhi kuzhambu* :**

Dose **:** *Lemon size* (38.4856gm)

Indications **:** *Erikaamalai, Suzhal kaamalai, paandu, manjal kaamalai, azhal kaamalai.*

- *Sarabendhrar Vaidhya Muraigal – P.K.S., Pg.No : 7*

Kandamalagam:

Dose : *3 varaganedai* (12.6gm)

Indications : *Ratha pitham, pitha paandu, swasam, veekkam, kaamalai.*

- *Sarabendhrar Vaidhya Muraigal – P.K.S., Pg.No : 38*

Maha ashwagandhi chooranam:

Dose : *Thirigadi* (800 – 1000mg)

Indications : *Megam 18, swasam 5, kaasam 5, paandu 5, gunmam 8, asthi suram.*

- *Sarabendhrar Vaidhya Muraigal - P.K.S.,Pg.No : 102*

3.9.2 BOTANICAL ASPECT:

Botanical name : *Cuminum cyminum.linn*

Taxonomical classification:

Kingdom	:	Plant
Class	:	Dicotyledonae
Sub class	:	Polypetalae
Family	:	Apiaceae
Genus	:	*Cuminum*
Species	:	Cyminum

Description:

Habitate:

It is cultivated throughout the temperate, sub-tropical region like in India, Persia, Afghanisthan

Habit:

A small slender, erect and annual herb about with the much branched angular and striated stem.

Leaves:

Two or three ,bi pinnate ,dissected, ultimate segments linear, filiform, sheaths white margined.

Inflorescence:

In compound umbels.

Flowers:

Bisexual, irregular, actinomorphic, epigynous, white in terminal leaf opposed, few rayed.

Calyx:

Calyx teeth small on the inferior ovary.

Corrolla:

Five petals at various size, free, yellow in colour.

Androecium:

5 Staments, free.

Gynoecium:

Bicarpellary,Syncarpous pistil, inferior ovary, two chambers, one ovule in each chamber.

Fruit:

The fruits are greyish about ¼ inch long, tapering towards both baseand apex and compressed laterally with ridges covered by pupillose hairs. The hairs may be absent in some forms.

Chemical constituents:

The chief constituents is cumaldenyde $C_{10}H_{12}O$ which forms nearly 20 – 40% of the oil. Besides the aldehyde, the oil contains P – cymene, Pinene, dipentanene, cumene, cuminic alcohol, B – phellandrene and terpenol.

Seeds analysis carbohydrates 36.3% , moistures 11.9, protein 18.7, fiber 12, calcium 1.08, phosphorus 0.49%, iron 31mg/100gms, Vitamin A – 870 I.u/100gm and Vitamin C 3mg/100gm.

Therapeutic uses:

Cumin seeds are aromatic and spicy externally, used as condiment. In digenous medicine, cumin seeds here long been considered stimulant and carminative stomachic, astringent and useful in diarrhoea and dyspepsia.

3.9.3 LATERAL RESEARCH WORK:

Pharmacological activity of *Cuminum cyminum*:

Cuminum cyminum and *Carum carvi* are the sources of cumin and caraway seeds respectively, which have been used since antiquity for the treatment of various indications in traditional healing systems in wide geographical areas. Cumin and caraway seeds are rich sources of essential oils and have been actively researched for their chemical composition and biological activities. In recent times (especially during the last 3 years) considerable progress has been made regarding validation of their acclaimed medicinal attributes by extensive experimental studies. The aromatic substances present in these herbs have attracted enormous attention of researchers worldwide to experimentally validate the therapeutic uses of cumin and caraway seeds, which are documented in several indigenous healing systems. The cumin and caraway oils exhibited high antioxidant activity which has been attributed largely to the presence of monoterpene alcohols, linalool, carvacrol, anethole and estragol, flavonoids and other polyphenolic compounds.

Journal Name : ncbi.n/m.nih.gov

Author Name : RK Johri, 2011

3.10.BLACK CUMIN, SMALL FENNEL - கருஞ்சீரகம்

3.10.1GUNAPADAM ASPECT:

Synonyms: *Aranam, Upakunjigai*

Vernacular names:

Eng	:	Black cumin
Tel	:	Nalla - Jilakarra
Mal	:	Karunseeragam
Kan	:	Kari - jirigi
Sans	:	Upakunchika
Hindi	:	Kulanji, kala - zira

Parts Used: Seeds

Organoleptic characters:

Taste	–	Bitter
Potency	–	Hot
Bio-transformation	–	Pungent

Actions:

Carminative, Diuretic, Emmenogogue, Galactogogue, Anthelmentic Stomachic, Paracitiside, Emollient

General characters:

கருஞ்சீ ரகத்தான் கரப்பனொடு புண்ணும்
வருஞ்சீராய்ப் பீநசமு மாற்றும் - அருந்தினால்
காய்ச்சல் தலைவலியுங் கண்வலியும் போமுலகில்
வாய்ச்ச மருந்தெனவே வை.

- அகத்தியர் குணவாகடம்

It cures mandaikarappan, pun, utchoodu, thalai noi, kan noi, sirangu, gunmam, vayitru porumal, marbuvali, irumal,vandhi,kamalai, okkalam.

Traditional uses:

It cures intermittend fever,Skin diseases.

It is externally applied for remove intestinal worm.

It's oil is used both internally & externally for aphrodisiac activity.

It is externally applied for oedema also.

Medicine preparations:

***Sinjadhi kuzhambu* :**

Dose : *Lemon size* (38.45gm)

Indications : *Erikaamalai, Suzhal kaamalai, paandu, manjal kaamalai, azhal kaamalai.*

- *Sarabendhrar Vaidhya Muraigal – P.K.S., Pg.No : 7*

Erukkambal Chooranam

Dose : *Thirigadi* (800 – 1000mg)

Indication : *Paandu(* Anaemia), *Pitham, Kayam*

- *Agasthiyar 2000, Pg.No : 358*

Kaandhathi mandoora chendhooram

Dose : *2 panavedai* (976mg)

Indication : *Paandu* (Anaemia), *mahodharam, kamalai*(Jaundice), sogai, *Irumal, Peruvayiru, Thimiram*

- *Sarabendhrar Vaidhya Muraigal – P.K.S., Pg.No : 30*

Karungoli chooranam

Dose : *Thirigadi* (800 – 1000mg)

Indication : *Ashta gunmam, Sogai, Paandu, Mahodharam, neerkovai, veppu vadham.*

- *Anuboga Vaidhya Brahma Ragasiyam, Pg.No:114*

Kaalagini mathirai

Dose : *Milagalavu* (56mg)

Indications : *Paandu, sogai, sanni 13, irumal, rathamoolam*

-Anuboga Vaidhya Brahma Ragasiyam, Pg.No:85

3.10.2.BOTANICAL ASPECT

Botanicl name : *Nigella Sativa.linn*

Taxonomical classification:

Kingdom	:	Plantae
Subkingdom	:	Tracheobionta
Superdivision	:	Spermatophyta
Division	:	Magnoliophyta
Class	:	Magnoliopsida
Subclass	:	Magnoliidae
Order	:	Ranunculaceae
Family	:	Ranunculaceae
Genus	:	*Nigella*
Species	:	*Sativa*

Description :

Nigella sativa (black caraway, also known as black cumin, nigella, and *kalonji*) is an annual flowering plant in the family Ranunculaceae, native to south and southwest Asia.

N. sativa grows to 20–30 cm (7.9–11.8 in) tall

Flowers:

Nigella blooms in the summer with blue, pink or white flowers and have feathery leaves.

Seeds:

The seeds are often used as a condiments, medicine and source of an essential and fixed oil. It can be harvested from the wild but is also often cultivated, especially in east Africa

Constituents :

N. sativa oil contains linoleic acid, oleic acid, palmitic acid, and trans-anethole, and other minor constituents. Aromatics include thymoquinone, dihydrothymoquinone, p-cymene, carvacrol, α-thujene, thymol, α-pinene, β-pinene and trans-anethole. Oils are 32% to 40% of the total composition of N. sativa seeds. The seeds also contain thymoquinone.

3.10.3 . LATERAL RESEARCH WORK

A review on therapeutic potential *of Nigella sativa:*

Nigella sativa seed aqueous extract to minimize the severity of liver damage via its antioxidant properties and its role in maintenance of cell ion-homeostasis. Annoyances in serum levels of some antioxidants and trace metals in human hepatitis C infected patients were compared with that from acetaminophen-induced hepatotoxic rabbits. Serum analysis of human patients and that of hepatotoxic rabbits have exhibited the same trend of incidence of liver marker enzymes, antioxidant levels, and trace metal concentrations, except for the serum levels of cobalt. Significance of pre-/ or post-treatment of Nigella sativa to acetaminophen induced-hepatotoxic rabbit has also evaluated. NS post-treatment to rabbits has been found effective in normalizing the levels ($P<0.001$) of serum liver markers; especially the ALP levels, and the antioxidants. Nigella sativa might be used in diabetic patients to prevent lipid peroxidation, increase anti-oxidant defence system activity and also prevent liver damage.

Journal Name : Pak J Pharm Sci. 2019 Jan

Author Name : Saadia M, Sher M, Bashir S, Murtaza MA, Shah A, Khan MA

3.11. *TURMERIC* – மஞ்சள்

3.11.1. GUNAPADAM ASPECT

Synonyms : Arisanam, Kaansani, Nisi, Peetham

Vernacular names:

English	-	Turmeric
Telugu	-	Pasupu
Malayalam	-	Mannal
Sans.	-	Haridra
Hindi	-	Haldi
Kan	-	Arisina

Parts used: Rhizome

Organoleptic characters:

Taste	**:**	Bitter , Pungent
Potency	**:**	Hot potency
Bio transformation	**:**	*Karpu*

Actions:

Hepatic tonic, Stimulant, Carminative

General characters:

பொன்னிறமாம் மேனி புலானாற்ற மும்போகும்
மன்னு புருட வசியமாம் - பின்னியெழும்
வாந்திபித்த தோடமையம் வாதம்போந் தீபனமாங்
கூர்ந்தமஞ்ச ளின்கிழங்குக்கு.

தலைவலிநீ ரேற்றஞ் சளையாத மேகம்
உலைவுதரு பீனசத்தி னூட - வலிசுரப்பு
விஞ்சு கடிவிடமும் வீறுவிர ணங்களும்போம்
மஞ்சள் கிழங்குக்கு மால்.

- அகத்தியர் குணவாகடம்

It gives golden shining when externally used. It is used as appetizer. It cures Vomiting, headache, leucorrhea, thiridosa, five types of pain, beetle bite, leprosy, sinusitis.

Traditional uses:

It is externally used with neem leaves for chickonbox.

Turmeric powder is sprinkled over ulcers for healing.

Turmeric water drinking for kaamalai.

Medicine preparations:

Kaandhathi mandoora chendhooram

Dose : 2 panavedai (976mg)

Indication **:** *Paandu*(Anaemia), *mahodharam, kamalai* (Jaundice), *sogai, Irumal, Peruvayiru, Thimiram*

- *Sarabendhrar Vaidhya Muraigal – P.K.S., Pg.No : 30*

Kalyani Kirudham:

Dose **:** ½ thola (5.8gm)

Indications **:** *Paandu* (Anaemia), *sogai, suram, pun, neerilivu*

- *Sarabendhrar Vaidhya Muraigal – P.K.S.,Pg.No : 2*

Dheebakkini chooranami :

Indications **:** *Paandu, magodharam, Kamalai, moolarogam,] ilaippu, irumal, gunmam*

- Anuboga Vaidhya Muraigal, Pg.No:115

***4. Siddha mandooram* :**

Dose **:** *Kalarchikkai alavu* (2.688gm)

Indications **:** *Paandu, Sobai*

- Gunapadam Thadhu – Jeeva Vaguppu, Pg.No:200

5. Narayana Mandooram:

Dose **:** *Puliyankottai alavu* (700 – 800mg)

Indications **:** *Paandu, Sobai, Kaamalai, Gunmam, Shayam*

- *Gunapadam Thadhu – Jeeva Vaguppu, Pg.No:201*

3.11.2 BOTANICAL ASPECT:

Botanical Name : *Curcuma Longa.linn*

Taxonomical classification:

Kingdom	:	Plantae
Subkingdom	:	Tracheobionta
Superdivision	:	Spermatophyta
Division	:	Magnoliophyta
Class	:	Liopsida
Subclass	:	Zingiberidae
Order	:	Zingiberales
Family	:	Zingiberaceae
Genus	:	*Curcuma*
Species	:	*longa*

Description:

The plant is rhizomatous, herbaceous, and perennial, and is native to the Indian subcontinent and Southeast Asia, and requires temperatures between 20 and 30 °C (68 and 86 °F) and a considerable amount of annual rainfall to thrive. Plants are gathered each year for their rhizomes, some for propagation in the following season and some for consumption.

Leaves:

The leaves are alternate and arranged in two rows. They are divided into leaf sheath, petiole, and leaf blade. From the leaf sheaths, a false stem is formed. The petiole is 50 to 115 cm (20–45 in) long. The simple leaf blades are usually 76 to 115 cm (30–45 in) long and rarely up to 230 cm (91 in). They have a width of 38 to 45 cm (15 to 18 in) and are oblong to elliptical, narrowing at the tip.

Inflorescence & Flowers:

At the top of the inflorescence, stem bracts are present on which no flowers occur; these are white to green and sometimes tinged reddish-purple, and the upper ends are tapered.

The hermaphrodite flowers are zygomorphic and threefold. The three sepals are 0.8 to 1.2 cm (0.3 to 0.5 in) long, fused, and white, and have fluffy hairs; the three calyx teeth are unequal. The three bright-yellow petals are fused into a corolla tube up to 3 cm (1.2 in) long. The three corolla lobes have a length of 1.0 to

1.5 cm (0.4–0.6 in) and are triangular with soft-spiny upper ends. While the 1.0 average corolla lobe is larger than the two lateral, only the median stamen of the inner circle is fertile. The dust bag is spurred at its base. All other stamens are converted to staminodes. The outer staminodes are shorter than the labellum. The labellum is yellowish, with a yellow ribbon in its center and it is obovate, with a length from 1.2 to 2.0 cm (0.5 to 0.8 in). Three carpels are under a constant, trilobed ovary adherent, which is sparsely hairy.

Fruits:

The fruit capsule opens with three compartments

Chemical constituents:

Turmeric powder is about 60–70% carbohydrates, 6–13% water, 6–8% protein, 5–10% fat, 3–7% dietary minerals, 3–7% essential oils, 2– 7% dietary fiber, and 1–6% curcuminoids. Phytochemical components of turmeric include diarylheptanoids, a class including numerous curcuminoids, such as curcumin, demethoxycurcumin, and bisdemethoxycurcumin. Curcumin constitutes up to 3.14% of assayed commercial samples of turmeric powder (the average was 1.51%); curry powder contains much less (an average of 0.29%). Some 34 essential oils are present in turmeric, among which turmerone, germacrone, atlantone, and zingiberene are major constituents.

3.11.3 LATERAL RESEARCH WORK:

Free radical scavenging active components from *Curcuma longa*:

In folk medicine, the rhizome juice from *C. longa* is used in the treatment of many diseases such as anthelmintic, asthma, gonorrhea and urinary, and its essential oil is used in the treatment of carminative, stomachic and tonic . In traditional medicine, several plants and herbs have been used experimentally to treat liver disorders, including liver cirrhosis. *Curcuma longa* possesses anti oxidant , anti-tumor , antimicrobial , anti-inflammatory , wound healing , and gastroprotective activities . Curcuminoids and gingerols have been reported to have antimicrobial, antifungal, anti-inflammatory, and antioxidant activities. Curcuma longa has several components with immunomodulatory and antioxidant properties. A direct HPTLC assay was developed for the determination of total curcuminoids and three individual curcuminoids, curcumin, demethoxycurcumin and bisdemethoxycurcumin. In addition, a new procedure was developed to separate and quantitative the free radical-scavenging activity of individual compounds from the rhizome of Curcuma longa L. (Zingiberaceae) based on the combination of HPTLC with a diode array detector (DAD) and post chromatographic DPPH(*) radical derivatisation. It was established that both individual curcuminoids and the extract of C. longa were capable of scavenging DPPH(*) radicals. From the estimated ID(50) values, it can be seen that the order of activity was curcumin > demethoxycurcumin

Journal Name : BMC Complement Altern Med. 2013,March 5

Author Name:Suzy M Salama,Mahmood Ameen Abdulla,
Ahmed S AlRashdi ,Salmah Ismail, Salim S
Alkiyumi, andShahram Golbabapour

3.12. *TREE TURMERIC, FALSE CALUMBA*– மரமஞ்சள்

3.12.1. GUNAPADAM ASPECT

Synonyms : *Kaleyagam, Thaaruvi*

Vernacular names:

English	-	Tree Turmeric, False calumba
Telugu	-	Manu - pasupu
Malayalam	-	Mara - mannel
Sans.	-	Darvi
Hindi	-	Jhar - haldi
Kan	-	Madrada - arisina

Parts used: Bark

Organoleptic characters:

Taste	**:**	Bitter
Potency	**:**	Hot potency
Bio transformation	**:**	*Karpu*

Actions: Febrifuge, Stomachic, Tonic

General characters:

அழன்றகண மூலம் அருசி யுடனே
உழன்ற கணச்சுரமும் ஓடுஞ் - சுழன்றுள்ளே
வீறுசுர முந்தணியும் வீசுமர மஞ்சளுக்குத்
தேறு மொழியனமே! செப்பு

- **அகத்தியர் குணவாகடம்**

It cures Kanam, Moola noi, Suvayinmai, Kanasuram, Utsuram.

Traditional uses:

The decoction is cures *kanam , moola noi, suvayinmai, kanasuram, utsuram, surathirku pin kaanum ayarvu.*

It is externally applied on forehead to relief heat and applied for oedema and skin lesions.

Medicine preparations:

Mandoora chooranam

Dose : *40 kunri (1 kazhanchu)*

Indication **:** *Paandu (Anaemia), Kaamalai, Kaal veekkam, Vayitril ulla katti.*

- *Sarabendhrar Vaidhya Muraigal – P.K.S.,Pg.No : 39*

Kalyani Kirudham:

Dose **:** *½ thola (5.8gm)*

Indications **:** *Paandu (Anaemia), sogai, suram, pun, neerilivu*

- *Sarabendhrar Vaidhya Muraigal – P.K.S., Pg.No : 2*

Dheebakkini chooranami :

Indications **:** *Paandu, magodharam, Kamalai, moolarogam, ilaippu, irumal, gunmam*

- Anuboga Vaidhya Muraigal, Pg.No:115

4. ***Kadukkai nei*:**

Dose **:** *½ Thola* (5.8gm)

Indications **:** *Paandu, kaamalai*

- *Sarabendhrar Vaidhya Muraigal – P.K.S.,Pg.No : 69*

1. ***Siddha Mandooram:***

Dose **:** *Kalarchi alavu* (2.688gm)

Indications **:** *Paandu, Sobai.*

- *Gunapadam Thadhu – Jeeva Vaguppu, Pg.No:200*

3.12.2. BOTANICAL ASPECT:

Botanical Name : *Coscinium fenestratum.linn*

Taxonomical classification:

Kingdom	:	Plantae
Order	:	Ranunculales
Family	:	Meninspermaceae
Genus	:	*Coscinium*
Species	:	*fenestratum*

Description:

Coscinium fenestratum is a sturdy woody climber with leathery, shiny leaves and bright yellow sap. It is dioecious, flowering and fruiting in August to October. The fruits consists of one or two drupes up to 2 cm (0.8 in) across. The plant has a generation span of 25 years.

Distribution:

The habitat for Coscinium fenestratum spans South Asia and parts of Southeast Asia, from India to Indonesia. It can only thrive in a tropical climate and prefers mixed and dense evergreen forest, with fertile soil and high moisture.

The plant has been determined to be native to Sri Lanka and the Western Ghats in India. It is unclear if the populations in Cambodia, Vietnam and west Malaysia are truly wild or the result of cultivation.

Leaves:

Leaves are oblong deltoid, obscurely peltate, acuminate, glabrous above, hairy and reticulate beneath.Petiole is long.

Seeds:

Seed is globose.

Flowers:

It is a dioecious plant and comes to bloom from August to October. Flowers are green, borne in dense globose heads. Sepals are 6 in number with a bract, orbicular persistent. Petals are 3 in number, large, spreading and elliptic.

Fruits:

Fruit is a drupe globose, villous and bony endocarp.

Chemical constituents:

The primary bioactive ingredient in Coscinium fenestratum is berberine, but also palmatine and jatrorrhizine.

3.12.3 LATERAL RESEARCH WORK:

Free radical scavenging active components from *coscinium fenestratum*: In the present study, antioxidant activity and antibacterial activity leaf and stem extracts of Coscinium fenestratum was investigated. To assess the antioxidant activity, methanolic leaf and stem extracts were used. Free radical scavenging activity was evaluated using 1,1-diphenyl-2-picryl-hydrazyl (DPPH) and 2,2'-azino-bis(3-ethylbenzothiazoline-6-sulphonic acid) or ABTS. For antimicrobial activity, aqueous, acetone, ethanol and methanloic extracts of stem and leaf extracts were tested for its potent antimicrobial activity against Staphylococcus aureus, Escherichia coli, Pseudomonas aeruginosa and Bacillus subtilis. Total content of phenol and flavonoid was quantitatively estimated in leaf and stem extracts of Coscinium fenestratum. Total phenoilc content in the stem and leaf was found to be 8.35±0.56 and 3.35±0.67 mg GAE/g extract, While the total flavonoid content in the stem and leaf were found to be 12.8±0.88 and 3.2±0.78 mg QE/g extract respectively.

Journal Name : Asian journal of pharmaceutical and clinical research, 2013

Authour Name : Santhosh W Goveas, Asha Abraham.

3.13. ASAFOETIDA – பெருங்காயம்

3.13.1. GUNAPADAM ASPECT:

Synonyms :

Aththiyagragam, Ingu, Ranam, Ramadal, Gandhi, Kaayam, Sandhunaasam, Poodhanaasam, Valligam.

Vernacular names:

Tamil	:	Perungayam
Eng	:	Asafoetida
Tel	:	Inguva
Mal	:	Perungayam
San	:	Hingu, Balhika
Hindi	:	Hing
Kan	:	Hing

Parts Used: Gum Resin

Organoleptic characters:

Colour	**:**	Yellow**,**white
Odour	**:**	Garlic odour
Taste	**:**	Bitter, Soluble in alcohol
Potency	**:**	Hot
Bio-transformation	**:**	Pungent

- Gunapadam mooligai vaguppu

It is yellow in colour, soluble in alcohol, grind with water, it becomes milky.

Actions:

Stimulant, Carminative, Anti – spasmodic, Expectorant, Laxative, Anti – helminthic, Diuretic, Aphrodisiac, Emmenagogue, Nervine tonic, Sedative, Digestive.

General characters:

தந்தவே தந்த மூலத்தெழும் பிணி சருவகாளம் விருச்சிகங் கீடம்மா
மந்தம்வாதம் உதரவர்த்தம் அல்குல்நோய் மார்பணங்கட்ட குன்மம்மகோதரம்
உந்துகெர்ப்பத்தின் வித்திரஞ்சூலைக்சூர் உதிரப்பூச்சி சிலேத்துமத்துறும்வலி
வந்தமெய்க்கடுப் போடிவைமுற்றுமே மாயுநாறுநற் காயங்கிடைக்கினே

- அகத்தியர் குணவாகடம்

It cures teeth disease, Vadha disease, Gastric ulcer, Ascites, Kapha disease, Body pain, Iraippu.

Traditional uses:

1. It cures abdominal distention, indigestion, gastric ulcer, increased vadha, ear disease.
2. It cures vadha disease, eight type of gastric ulcer, vaginal disease, uterine problems, kapha disease, tooth disease, ascites, chest pain.
3. It stimulate the indestinal and respiratory tract and nervous system.
4. Useful in asthma, whooping cough and chronic bronchitis.
5. Also administrated in histerical and epileptic affections and in cholera.

Medicine preparations:

Karungoli chooranam :

Dose : *Thirigadi pramanam* (800 – 1000MG)

Indications : *Ashta gunmam, Sogai, Mahodharam, Paandu, Neerkovai, Veppu,Vaivu, Vaadham*

- *Anuboga Vaidhya Brahma Ragasiyam, Pg.No:114*

Dheepakkini chooranam :

Indications : *Seetha kattu, vadha rogam, Ashta gunmam, Mahodharam, Malapandham, Paandu, Kaamalai, Moolarogam, Moolamulai,Irumal, Ilaippu, Asiranam, Vaandhi, Vaadha pitham*

- *Anuboga Vaidhya Muraigal, Pg.No:115*

Saamuthara chooranam:

Dose : *2 Varaganedai (8.4gm)*

Indications : *Ashta gunmam, Vayitru vali, Asiranam, Vadham 80, Kragani 11, Moolam, Paandu, Mahodharam.*

- *Anuboga Vaidhya Brahma Ragasiyam, Pg.No:100*

Saathilinga kuligai :

Dose : *Kundrimani (130mg)*

Indications : *paandu, Kaamalai, moolam, Peruvayiru, Gunmam, Swasam, Pedhi, Sanni.*

- *Sarabendhrar Vaidhya Muraigal – P.K.S., Pg.No : 96*

3.13.2. BOTANICAL ASPECT

Botanical Name : Ferula Asafoetida.linn

Taxonomical classification:

Kingdom	-	Plantae
Division	-	Phanerogam
Class	-	Dicotyledons
Sub class	-	Polypetalae
Order	-	Umbellales
Family	-	Umbelliferae
Genus	-	*Ferula*
Species	-	*Asafoetida*

Distribution:

From central Himalayas to Assam, lower hills of Bengal, evergreen forests of western ghats from kontan to Travancore also cultivated in Afghanistan, srilanka, Pakistan, malaysia, and singapore.

Botanical description:

Petiole :

About 9 inches triangula – cylindrical, solid, with a short , membraneous, intra – petiolar ligula at the base, the rachis laterally compressed double winged along the top with the narrow decurrent bases of the leaflets.

Flowers :

Flowers polygamous the fertile umbels large, solitary, terminating the lateral branches, the male much smaller, very dense, globular, clustered at the ends of peduncles, flowers are 10 – 20 in the main and 5 – 6 is partial umbels.

Calyx :

Calyx teeth very slightly marked.

Corolla :

Petals oblong – ovate, entire – pale yellow.

Androecium :

Filaments are as long as the petals.

Gynoecium :

Styles, long, spreading, deciduous, stylopod, prominent, cupped with a sinuous (or) lobed margin.

Chemical constituents:

Ferulic acid, Umbelliferone, Sulphide of ferulyl, two terpenes, sesquiterpene, asaresinotannol, Glucuronic acid, Galactose, Arabinose, Ramnose and protein.

Volatile oil:

The odour and stimulant property of asafoetida are due to this oil which may be obtained by the distilling asafoetida with water or alcohol. It contains several sulphide of ferulyl, 2-terpenes which yield sesqueterpene and a blue coloured oil.

The resin portion consisted of asaresinotannol, free of combined with ferulic acid.

Umbelliferone present in the combined state oil of asafoetida is obtained by the steam distillation of the gum resin.The physico chemical properties of oil are as follows

Specific gravity – 1,493 – 1,515

Sulphur content – 15.3 – 29%

Pinene, another terpenes present.

The disagreeable odour of the oil is reported mainly to the di sulphide.

3.13.3. LATERAL RESEARCH WORK:

Pharmacological profiles of *Ferula asafoetida linn*.

The gum resin is antispasmodic, carminative, expectorant, laxative, and sedative. The volatile oil in the gum is eliminated through the lungs, making this an excellent treatment for asthma. The odor of asafoetida is imparted to the breath, secretions, flatus, and gastric eructations. Its properties are antispasmodic, expectorant, stimulant, emmenagogue and vermifuge. Asafoetida has also been used as a sedative. It also thins the blood and lowers blood pressure. It is widely used in India in food and as a medicine in Indian systems of medicine like ayurveda. Asafoetida has been held in great esteem among indigenous medicines, particularly in Unani system from the earliest times. Asafoetida has been consumed as a spice and a folk medicine for centuries. Recent studies have shown several promising activities particularly relaxant, neuroprotective, memory enhancing, digestive enzyme, antioxidant, antispasmodic, hypotensive, hepatoprotective, antimicrobial, anti carcinogenic, anticancer, anticytotoxicity, antiobesity, anthelmintic and antagonistic effect.

Journal Name : pharmacognosy review 6(12),141,2012

Authour Name : Poonam mahendra, Shradha Bisht

3.14.IRON RUST – மண்டூரம்

3.14.1.GUNAPADAM ASPECT

Synonyms:

Kittam, Chittam, Ayomalam, Ayakittam, Chittan, Logamandooram, Ayachittam.

Vernacular Names

Eng	-	Iron rust, Impure oxide of iron, Magnitite.
Tamil	-	*Irumbu chittam.*
Sans	-	Mandooram
Hindi	-	Lohaka zang.
Malay	-	Irumbak kitani
Ben	-	Lohar-gu
Arab	-	Khabsul hadid
Pers	-	Zang –ahana
Duk	-	Lohaka-gu.

Organoleptic Characters

Taste	**–**	Astringent
Potency	-	Hot potency
Biotransformation	-	Pungent

Actions: Stomachic, Tonic, Alterative

General Characters

"சிட்டமொன்றாய் சோபை கிளை வீக்கம் மத்திசுரந்
துட்டவிட பாகஞ் சுவாசமையங் - கெட்ட கொடும்
பாண்டிருமல் நீராமை பாழும் பிரமிய முன்
தாண்டி விடு முண்டி ரத்த தாது"

-குணபாட தாது சீவ வகுப்பு.

Mandooram relieves, Dropsy(*Sobai*), Oedema (*Veekam),* Fever (*Suram),* Bronchial, Asthma *(Iraippu) ,* Anaemia (*Paandu),*Cough (*Erumal),* Abscess(*Katti),* Leucorrhoea (*Piramiyam)* and Increases the Hb conentration.

Traditional Uses

1. *Mandooram* is specially useful in anaemia,amenorrhoea,dysmenorrhoea, menorrhagia,chlorosis, chronic bowel complaints,dyspepsia,intestinal worms,nervous diseases,trigeminal neuralgia,kidney diseases, albuminuria.

2. For dyspepsia and congested liver etc., a powder composed of *Mandooram* and *Panchalavana*(The five salts) 5parts of each ,and Amla 4parts is useful.Dose is 10 grains.
3. To women with scanty menstruation *Mandooram* is given in combination with aloes and other stimulants.
4. Take *mandooram* powder with *karisalai* juice for ascites, peptic ulcer.
5. *Mandoora chenduram* used for anaemia.

Contraindication

The most important conditions under which the use of *Mandooram* should be avoided are feverishness produced either by chronic diseases, local irritation as in dyspepsia attended with constipation.

Medicine preparations:

Karisalai Legiyam

Dose : *Punnaialavu (3 – 5gm)*

Indication : *Paandu, pitherivu,vandhi,kirani*

- *Siddha Vaidhya Thirattu, Pg.No:238*

Mandoora Chendhooram

Dose : *Kunri alavu (130mg)*

Indication : *Paandu,Kaamalai,Sogai,Pithanoi,Vikkal*

- *Siddha Vaidhya Thirattu, Pg.No:154*

Kaanthadhi chooranam

Dose : *Mooviral alavu (800 – 1000mg).*

Indication : *Sogai, Kaamalai*

- *Sarabendhrar Vaidhya Muraigal – P.K.S., Pg.No : 26*

Mandoora Chooranam:

Dose : *1 Kazhanchu (5.12gm)*

Indication : *Paandu, Kaamalai, Irumal,Vaandhi*

- *Sarabendhrar Vaidhya Muraigal – P.K.S.,* Pg.No : 39

Siddhamandooram:

Dose : *Kazharchi alavu (2.688gm)*

Indication : *Paandu, Sogai*

- *Gunapadam Thadhu – Jeeva Vaguppu, Pg.No:200*

3.14.2.GEOLOGICAL ASPECT

FERROSO FERRIC OXIDE,

IRON RUST IMPURE OF IRON

Chemical Name **:** Fe_2SiO_4

Definition:

Mandooram is a metallic oxide-cum-silicate of iron, generally having the composition Fe_2SiO_4 and commonly called slag.

Synonyms:

Kitta, Lohamala, Loha Kitta.

Broad classification:

Metallic oxide-cum-silicate

Origin and occurrence:

Mandoora is the by-product of the metallurgical process during extraction of Iron(Fe) and copper(Cu) from their respective ores.It occurs as lumps,boulders or aggregates at the areas where smelting activity is carried out for the extraction of copper and iron .

Iron is the main constituent of *Mandoora* followed by Silica with minor amounts of Cu, S, Pb, Zn, Ag, Cd and Au.

Mandoora is known since ancient times in India and occurs in over 500 years old slag dumps near village Singhana (Khetri), distt. Jhunjhunu (Rajasthan). Mandoora of similar quality may occur at other places also in the country where smelting of copper ore was carried out in the past.

Physical properties:

Nature	-	Rough lumpy masses, exhibiting voids.
Colour	-	Black
Streak	-	Black
Fracture	-	Conchoidal
Lustre	-	Dull
Tenacity	-	Brittle but hard
Transparency	-	opaque
Magnetism	-	Non-magnetic
Hardness	-	6 to 6.5
Sp. Gr	-	3 to 3.8

Chemical properties:

1.*Mandoora* should contain not less than 30% Iron(Fe)when analysed by gravimetric method.

2. *Mandoora* should contain not less than 30%Silica when analysed by gravimetric method.

3. *Mandoora* should show not less than 80% fayalite(Fe_2SiO_4) when studied through XRD method.

3.14.3. LATERAL RESEARCH WORKS :

Haematinic evaluation of *lauha bhasma and Mandoora bhasma* on Hgcl2- induced anaemia in rats.

The present study was carried out to evaluate the haematinic effect of two ayurvedic preparations of iron on mercuric chloride – induced anaemia in rats. *Lauha bhasma and Mandoora bhasma* , two well –known ayurvedic iron preparations , are commonly used to treat anaemia. In Charles foster strain rats of either sex anaemia was induced by administering mercuric chloride (9 mg/kg).*lauha bhasma and Mandoora bhasma* (11mg/kg) were evaluated for their haematinic activity. The observed results suggest that *lauha bhasma and Mandoora bhasma* possess significant ($p < 0.05$) haematinic and cytoprotective activity.

Journal Name : www.ijpsonline.com,2007

Authour Name : P.K.Sarkar, P.K.Prajapati, A.K.Chowdhary

3.15. ROCK SALT – *INDHUPPU*

3.15.1.GUNAPADAM ASPECT

Synonyms:

Sainthavam, Sinthooram, Chandhiranuppu, Madhikoormai, Madhiuppu, Mindhasol

Vernacular Names

Tamil	:	Indhuppu, Sainthavum
English	:	Rock Salt, Halite
Hindi	:	Khanji namka, Saindhava, Lahori namak
Mar	:	Mitha
Gujarat	:	Mitha
Bengali	:	Nimok, Num

Organoleptic Characters

Taste	:	Uvarppu
Potency	:	Veppam
Pirivu	:	Inippu

Actions

Laxative, Diuretic, Carminative, Stomachic

General Characters

"அட்டகுன்ம மந்தம் அசிர்க்கரஞ்சூர் சீதபித்தந்
துட்டவையம் நாடிப்புண் டோடங்கள் - கெட்டமலக்
கட்டுவிட விந்தையக் காமியநோய் வன்கரப்பான்
விட்டுவிட விந்துப்பை விள்.

சென்னிக்கண்ணா பற்றூர் செவிகவுள்கண் டம்பகநோய்
சந்நியா சங்காசந் தாகமிரைப் - புன்னிரத்த
மூலஞ் சிலந்திநளி மூடிகநஞ் சூதை வலி
சூலஞ் சினையுமிந்தாற் சொல்." - குணபாட தாது சீவ வகுப்பு.

Rock salt cures eight types of gastric ulcers (*Gunmum*),indigestion,blood disease,*kabha pitha*,*kabha aathikkam*, Nerve syphilis,dearangement of three humours,constipation,poisons bite, spermatorrhoea, head, eye, tongue, tooth, skin, dunk, vaginaldiseases,delirium,cataract,polydipsia,asthma,haemorrhoids,abcess,rat bite,scorpion bite,vadha pain,thrombing pain etc.

Medicinal Uses

1. Rock salt is made into a paste and applied in case of sprain.
2. Hot fomentation of the rock salt can be taken for curing the painful swellings.
3. Rock salt is dissolved in warm water and administrated to induce vomiting.

Medicine preparations:

Sinjathi kulampu

Dose : *Elumicchankai alavu (38.456gm)*

Indication : *Erikaamalai, sulal kaamalai, paandu, manjal kaamalai.*

Sarabendhrar Vaidhya Muraigal – P.K.S., Pg.No : 7

Erukkambal chooranam

Dose : *Thirigadi alavu (800 – 1000mg)*

Indication : *Paandu, pitham, veppu paavai, kayam.*

- *Agasthiyar 2000,pg.no:358*

Kandaamalagam

Dose : *3 Varaganedai (12.6gm)*

Indication : *Ratha pitham, pitha paandu, swasam, veekkam.*

- *Sarabendhrar Vaidhya Muraigal – P.K.S., Pg.No : 38*

Elumichampala legiyum

Dose : *Kalarchikayalavu (2.688gm)*

Indication : *Irumal, paandu, kaamalai, vaandhi, kai kaal asathi, adhisaram, suram, rathaminmai, vishangal, veekkam.*

- *Sarabendhrar Vaidhya Muraigal – P.K.S., Pg.No : 40*

Kaalakkini mathirai

Dose : *Milagalavu* (56mg)

Indication : *Paandu, Mahodharam, sogai, sanni 13, Irumal, Rathamoolam.*

- *Anuboga Vaidhya Brahma Ragasiyam, Pg.No:85*

3.15.2.GEOLOGICAL ASPECT

INDHUPPU (ROCK SALT)

Chemical Name : NaCl

Definition:

Rock salt is mineral form (from halite mineral category) of sodium chloride, crystallizing typically in cubes and having perfect cubic cleavage. It occurs in crystalline massive and granular to compact form and is brittle mineral with a conchoidal fracture and viterous luster. It is colourless when pure but often tinged gray, blue, and brown pink because of associated impurities.

Synonyms:

Sainthavam, Sinthooram, Chandhiranuppu, Madhikoormai, Madhiuppu, Mindhasol

Broad classification:

Metallic oxide-cum-silicate

Origin and occurrence:

It is typically formed by the evaporation for salty water. (such a sea water). Which contain Na^+ and cl^- ions. One finds Rock salt deposits ringing at dry lake bed, island marginal sea and in closed bay and estuaries in and regions of the world.

Most of the rock salt are getting from mandi Himachal Pradesh (% basis). Rock salt deposits in Himachal Pradesh which the only state where Rock salt is mined in India.

Physical properties:

Name	-	Sodium Chloride Impura
Chemical formula	-	Nacl
Appearance	-	White (or) Clear solid
Molecular weight (Nacl)	-	58.4428
Atomic weight (Na^+)	-	22.98768 (39.337%)
Atomic weight (Cl^-)	-	35.4527(60.663%)
Viscosity	-	10^{18} poises at 18^0
		10^{17}poises at 80^0
Bulk density	-	1.154 (7216/ft^3)
Angle of response	-	32^0

Melting Point	-	1.465^0C (2.669^0F)
Hardness	-	2.5
Critical Humidity at 20^0C	-	75.3%
P^H of aqueous solution	-	Neutral
Specific gravity	-	0.204
Heat and fusion	-	1 – 3.5g cal/gm

Chemical properties:

Rock salt contain 96.4 to 98.9% sodium chloride, with the remaining minerals largely consisting of magnesium, potassium and calcium, as well as other trace minerals.

3.15.3. LATERAL RESEARCH WORKS :

Coupled Modelling of Physical/Chemical Retardation and Transport of CO_2/CH_4 for a Backfilled Salt Rock Repository

Rock and sea salts consist of some essential trace metals and some non-essential heavy metals like iron, zinc, manganese and cadmium, chromium, nickel, copper also founded. Rock salt is good when compared with sea salt. Rock salt is rich in both essential and non essential heavy metals, therefore, its used and recommended.

Journal Name : http://www.researchgate.net/publication/266869379

Authour Name : Mohammed Nafees, Nazish Khan, Shah Rukh, Adila Bashir

3.16.DISEASE REVIEW

3.16.1.SIDDHA ASPECT OF THE DISEASE

VELUPPU NOI

Synonyms :

Venmai Noi , Paandu .

Nature of the disease :

The nature colour of the body will be found changed , the body will appear pale . On examination of conjunctiva and nails , they appear pale due to loss of blood .

Genesis of the disease :

It is considered that the disease may be caused by the following factors :

By eating diets of too much salty and sour which will impair the potency of blood , as a sequale to Fever, Diarrhoea, Vomiting and Arthritis as a sequale to diseases such as, polymenorrhoea, Blood Pressure (*kuruthiazhal*), Dysentry, Haematemesis and Hemorrhoids which cause loss of blood from the body , by taking drugs which are too toxic in excessive doses , worm infestation , tachycardia, diarrhoea with mucus , liver diseases which will impair haemopoiesis , frequent ingestion of tobacco , betal leaves and arecanut , sand , ashes , sacred ashes and camphor.

Prodromal symptom:

1. The *Pitha dosha* becomes excessive in activity due to factors such as diet and impairs the colour and volume of the blood . In addition, it also makes the body pale without affecting the nutritional requirement of the body .

2. Later patient may develop fatigue of legs even walking for a short distance, dyspnoea, anorexia, nausea, giddiness, dimness of vision, frequent fainting, palpitation and emaciation of the body.

Types of diseases :

The disease has been classified into five types . Of these , four types are developed due to *dosha* and one type due to toxicity . They are ,

1 . *Vaatha* Anaemia (*Vali Paandu*)

2 . *Pitha* Anaemia (*Thee Paandu*)

3 . *Kaph*a Anaemia (*Iya Paandu*)

4 . *Tri – dosha* Anaemia (*Mukutra Paandu*)

5 . Toxic Anaemia (*Nachu Paandu*)

Besides, some ancient *siddhars* classified into one more type, viz .

The colour of the body will be changed and appear as yellow or blue ; the patient will develop excessive thirst , frequent giddiness and mental depression and impairment of learning.

1. Further, in men diminished sexual potency may also occur .
2. However , all these sub types have the clinical features of Anaemia , it is considered that there is no need to mention them separately .

General Features :

1. There will be reduction of body strength day by day and patient may not be in a position to walk , in addition the following features may also appear ;
2. Headache, Palpitation, Frequent blurring of vision, Vertigo, Giddiness, Breathlessness, Anorexia, Dislike to food, Vomiting even if small quantity of food ingested, Body become lean with pale and shiny appearance, Clubbing of nails.
3. Ulcer of the tongue or red appearance of the tongue as if the outer layer of the tongue has been scrapped .
4. Sometimes, the tongue may also be pale with lubricity appearing like silk cloth and sore throat.
5. If the disease occurs in women, the menstrual blood flow will be scanty and discoloured. However , in some women, there may be excessive menstrual blood flow. The disease may also occur as an associate illness of worm infestation and blood *pitha* disease which occur in children and elderly.
6. When the disease advances the patient may also develop the following features: Extreme fatigue , tiredness , breathlessness , excessive diarrhoea, dislike to food , loss of strength , generalized oedema .

***Dosha* and other features :**

1. As mentioned earlier, there will be loss of body strength with anorexia.
2. The food ingested will not be digested properly due to derangement of anal pitha.
3. The *Ranjaga pitha* which impart colour to the skin will also become hypovolemic and the *pitha dosha* will aggravate.
4. As a result the activities of the other *doshas* will be adversely affected.
5. As the disease advances, *kapha* also will be increased. So, swelling of the body will also occur.

Pulse :

If *chethuma* pulse is altered it may denote *paandu.*

Pitha vadha nadi, kapha vadha nadi, kapha nadi may be noted in Pandu.

3.16.2. MODERN ASPECT OF THE DISEASE ANAEMIA

Definition:

Anaemia is a condition in which the number of red blood cells or their oxygen carrying capacity is insufficient to meet physiological needs, which vary by age, sex, altitude, smoking and pregnancy status.

Causes of anaemia:

1. Decreased red blood cell production
2. Increased RBC destruction
3. Blood loss
4. Fluid overload(Hypervolemia)
5. Intestinal inflammation
6. Anaemia of chronic disease
7. Anaemia related to kidney disease
8. Anaemia related to pregnancy
9. Anaemia related to poor nutrition
10. Alcoholism
11. Anaemia related to medication
12. Other less common cause of anaemia include thyroid problems, cancers, liver diseases, autoimmune diseases (SLE), lead poisoning, AIDs, malaria, viral hepatitis, parasitic infection, bleeding disorder.

Signs and symptoms:

1. Pallor(pale skin, lining mucosa, conjunctiva, and nail beds)
2. Weakness or fatigue
3. Shortness of breath on exertion
4. Palpitations
5. Pica

Classification of anaemia:

1. Morphological classification:

1. Normocytic anaemia
2. Microcytic anaemia (Iron deficiency anaemia)
3. Macrocytic anaemia

2. Classification of anaemia based on etiopathogenesis:

1. Dyshemopoietic

2. Hemorrhagic
3. Hemolytic
4. Hypoplastic

Iron Deficiency Anaemia(IDA)

- Iron is an essential mineral that is needed to form hemoglobin, an oxygen carrying protein inside red blood cells.
- Iron deficiency anaemia is a condition in which the body lack enough red blood cell to transport oxygen rich blood to body tissues.

Etiological factors:

1. Blood loss
2. Poor diet
3. An inability to absorb enough iron from food

IDA can cause:

1. Brittle nails
2. Cracks in the sides of mouth
3. Extreme fatigue(Tiredness)
4. Chest pain
5. Pale skin
6. Fast heart rate
7. Headache
8. An enlarged spleen
9. Cold hands and feet
10. Frequent infections
11. Shortness of breath
12. Unusual craving – PICA

Complications:

1. In patients with heart disease severe anaemia may be precipitate Angina Pectoris
2. Infections are common in iron deficiency anaemia, especially those of the respiratory , Gastro intestinal and Urinary tracts.

Anemic ranges of hemoglobin:

1. Adult men <13.5 gm/dl
2. non pregnant women<12mg/dl

3. pregnant women<11 mg/dl

WHO Grading of Anaemia:

Hb between 10gm – Mild

Hb between 7gm to 10gm- Moderate

Hb under 7gm –Severe

Hb under 5gm-Very Severe

Metabolism of iron:

Absorption:

1. Iron is called as a one way substance ,because it is absorbed and excreted in small intestine
2. Iron is absorbed from upper small intestine.
3. Iron is absorbed in three forms:1. Ferrous iron, 2. Ferric iron, 3.heme iron
4. Iron is absorbed mainly in the ferrous form
5. Ferric ions are reduced with ascorbic acid& glutathione of food to more soluble ferrous (fe^{2+})form which is more readily absorbed than Fe^{3+}
6. After taken up by the intestinal mucosa, iron is either stored in the form of ferritin in the mucosal cells or transported across the mucosal cells to plasma in the form of transferrin.

Storage of iron:

1. Iron is stored in liver, spleen and bone marrow in the form of ferritin.
2. In the mucosal cells, ferritin is the temporary storage form of iron.
3. Ferritin contains about 23% iron
4. Ferritin in plasma level is elevated in iron over load.

Iron Lost From The Body

1. Mainly iron is lost from the body by desquamation.
2. Excessive sweating
3. About 1mg of iron is excreted through feaces each day
4. Whenever bleeding occurs additional quantity of iron is lost.
5. In women, about 20mg iron per period is lost during menstrual cycle.

3.17. PHARMACEUTICAL REVIEW

3.17.1.SIDDHA ASPECT OF THE FORMULATION

Definition of *vadagam:*

When the pills are quite large, say as much as 1 gm in weight they are often called vadagam.

Rules of trituration:

The ingredients of the pills were kept in a powder form separately then add them in required ratio as per literature. The powdered ingredients were kept in mortar then grind with leaf juice or any other liquid medium. Keep the time duration of grinding as per text.

Addition of aromatic ingredients:

Aromatic ingredients were added just before 24 mins *(1 naazhigai)*of pill rolled from finely grounded paste. The aromatic ingredients added pills should allowed to dry in shade, and keep them in a tightly closed container.

Size and shape:

Usually round in shape, therefore it also called as *urundai.* But it may differ in some preparations. e.g. *urai mathirai.* The size, shape and weight of the pills should be made as said in the literature evidence.

Shelf life:

1 year.

3.17.2. MODERN ASPECT OF THE FORMULATION

Definition of pills (*mathirai*):

A tablet is a pharmaceutical dosage form it is otherwise called as caplet. Medicinal tablets are called as "pills". Originally "pills" referred specifically to a soft mass rolled into a ball shape, rather than a compressed powder. (wikipedia. org).

As per Indian Pharmacopeia 2007 defined the pills are solid dosage forms each containing a unit dose of one or more medicaments. They are anticipated for oral route.

Classification:

As per IP2007 tablets are majorly classified into following categories (Indian pharmacopoeia 2007)

1. Uncoated tablets:

This type of tablets contains single layer or more than one layer tablet consisting of active ingredient with the excipients, no additional cover is applied on to it after the compression.

2. Coated tablets:

Coated types of tablets have an additional coating layer on it after the tablet was compressed, the coating layer of tablets formed with sugar, gums, resins, inactive or insoluble fillers, plasticisers, polyhydric alcohols, waxes.

3. Dispersible tablets:

These are the film coated or uncoated tablets because a uniform dispersion when suspended in water

4. Effervescent Tablets:

These type of tablets which are uncoated and are planned to be dissolved and produce an dispersion before they are administered the dissolution is achieved by the reaction between an organic acid and bicarbonate which produce CO_2, thus produced CO_2 will disintegrate the tablet so which dissolves in the solution to produce an suspension which was rapidly absorbed.

5. Modified-Release Tablets:

These types of tablets are the coated or uncoated tablets which are designed in such a way that the rate or location of the active ingredient released is modified. It includes enteric coated tablets, prolong release tablet or delay release tablet.

a) Enteric-Coated Tablets:

These are also called as gastro resistant tablets as they resistant to the gastric juices; these are formulated by coating the tablet with anionic polymer of methyl acrylicacid and their esters or by coating with cellulose acetyl pthylate. Ex: erythromycin, NSAIDS

b) Prolonged- release Tablets:

These types are otherwise called as sustain release tablets or extended release tablets was formulated in such a way that the active ingredient is released for a prolong duration of time and is available in systemic circulation after administration.

c) Delayed-release Tablets:

This dosage form was planned to release the drug after some time delay or after the tablet has passed one part of the GIT into another. All enteric coated tablets are type of delayed action tablet but all delayed action of tablets was not enteric or not intended to produce enteric action.

6. Soluble tablets:

These are coated or uncoated tablets which are planned to dissolve in water before they are administered.

7. Tablets for use in the mouth:

These are the tablet formulations which are planned to be show local action in the buccal cavity. These include buccal tablet, Sublingual Tablets and Troche or lozenges. Buccal tablets are placed in between the cheek and gingival. Sublingual tablets are placed below the tongue Eg: glyceryl trinitrate.

8. Tablets for other routes of administration:

These include implantable tablets and vaginal tablet. These are inserted in to the rectum or vagina for their local or system.

4. MATERIALS AND METHODS

4.1. PREPARATION OF THE DRUG :

Drug selection :

In this dissertation of "*Mandoora vadagam*" has been selected from the *siddha* literature, **"***Sarabenthrar Vaidhya Muraigal (Paandu-Kaamalai Sikitchai)***"** page no.58 authored by K.Vasudheva Sashthri,B.A and S.Venkatarajan,LIM

Ingredients of the drug are ,

1. *Mandooram (*Ferroso ferric oxide)
2. *Maramanjal* (Coscinium fenestratum.lin)
3. *Chevviyam* (Piper nigrum.lin - root)
4. *Dhevatharam* (Cedrus deodara.lin)
5. *Manjal* (Curcuma longa.lin)
6. *Perungayam* (Ferula asafoetida.lin)
7. *Karunjeeragam* (Nigella sativa.lin)
8. *Indhuppu* (Sodium chloride impura.lin)
9. *Kandanthippili.*(Piper longum.lin - root)
10. *Kadukkai thol* (Terminalia chebula.lin)
11. *Chukku* (Zingiber officinale.lin)
12. *Milagu* (Piper nigrum.lin)
13. *Thippili* (Piper longum.lin)
14. *Omum* (Carum copticum.lin)
15. *Seeragam* (Cuminum cyminum.lin)

Collection of the Drugs :

Mandooram and Indhuppu was bought from *Gopalan asan shop*, Nagercoil.

Other raw drugs were bought from Tirunelveli town.

Identification and Authentication :

All raw drugs were identified and Authenticated by the experts of *Gunapadam* (Pharmacology) department in Govt siddha medical college , Palayamkottai , Tirunelveli .

The Specimen samples of the identified raw drugs were presented in the laboratory of PG *Gunapadam* for future references.

Purification methods :

Mandooram:

Powder the drug very coarsely & mix with four parts by weight of tamarind leaves and eight parts by weight of water. Boil for four hours. Then recover the drug after removing the leaves. Boil with eight parts by weight of cow's urine till dehydrated. Wash in water, powder well and store.

Maramanjal :

The outer layer is removed made into small pieces and dried in sunlight.

Chevviyam:

Wash with water and allow it to dry.

Devadaru:

Wash with water and allow it to dry.

Dried Manjal :

The outer covering is scrapped off.

Perungayam :

It is fried and take it.

Karunjeeragam :

Soak in the limestone water and dried it.

Indhuppu :

Mix with the traditional vinegar and filter then dried into sunlight.

Kandanthippili :

Wash with water and allow it to dry.

Kadukkai:

The Inner seed is removed.

Chukku:

The outer covering is scrapped off.

Milagu:

It is fried at low flame.

Thippili :

Remove the adulterant and fry it.

Seeragam :

It is fried at low flame.

Process :

All the above purified ingredients except mandooram, placed in the stone mortar and pestle made into fine powder induvidually then it strained through cloth or sieve 80 and mixed well then purified mandooram is powdered and placed in stone mortar along with above mixture and it is triturated with cow's urine and made into pills at the size of Sundaikai (798 mg) and shade dried.

Dosage :

1 pills one time, for about 48 days.

Adjuvant :

Butter milk

Route of Administration :

Enteral route.

Indications :

All types of *Paandu***.**

Self life :

One year.

Food Restriction :

Avoid tamarind, Bitter taste food.

INGREDIENTS OF MANDOORA VADAGAM

Chukku

Milagu

Thippili

Kadukkai

Devadaru

Kandanthippili

Cheviyam

Maramanjal

Manjal

Perungayam

Karunjeeragam

Jeeragam

Omam

Indhuppu

Mandooram

MANDOORA VADAGAM

On Processing

Prepared Drug - Mandoora Vadagam

Drug : *MANDOORA VADAGAM*

4.2. STANDARDIZATION OF THE DRUG

The standardization of the drug is essential to exhibit the purity, quality and quantity of the drug. This is basically done by chemical, Physico chemical and instrumental analysis.

The particle size and qualitative analysis of chemical elements of *Mandoora Vadagam* are also assessed by Scanning Electron Microscope (SEM) and Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES) were done in IIT Chennai.

4.2.1. PHYSICAL STANDARDIZATION AS PER SIDDHA CLASSICAL LITERATURE

Colour Examination:

Ten tablets were taken into watch glasses and positioned against white back ground in white tube light. Its colour was observed by naked eye and note in results.

Odour examination:

Ten numbers of tablets were smelled individually. The time interval among two smelling was kept two minutes to overturn the effect of previous smelling. Odour of *Mandoora Vadagam* was noted in results table.

Size examination:

The diameter of ten tablets was measured by Vernier caliper. The mean value of diameter was noted. (Lohar DR-Protocol for testing ASU drugs)

Weight Variation Test:

It was carried out to make sure that, each number of tablets contains the proper amount of drug. The test was carried out by weighing the 20 tablets individually using analytical balance, then the average weight was calculated, and comparing the individual tablet weights to the average. (Sukalyan Sengupta 1988)

The percentage of weight variation is calculated by using this formula.

$$\% \text{ of wt. variation} = \frac{\text{Individual wt.} - \text{Average wt.}}{\text{Average .Wt.}} \times 100 \text{Average wt.}$$

Table No:1 Weight Variation limits of Tables (IP)

Average weight of tablets	Maximum percentage of weight difference allowed
80mg or less	± 10.0
Between 80mg and 250mg	± 7.5
250mg and more	± 5.0

Accepted tablet:

Weight Variation limits of the sample not more than two tablets are outside the percentage limit and no tablet differs by more than two times the percentage limit according to the above table.

Suspected tablet:

Suspected tablet variation was not more than six tablets are outside the percentage limit and no tablet differs by more than two times the percentage limit according to the table.

Rejected tablets:

When a tablet weight variation test results showed rejected tablets mean in that test sample one tablet differs by more than two times the percentage limit according to the table or More than six tablets are outside the percentage limit. (Sukalyan Sengupta, 1988)

Solubility:

A pinch of the sample was taken in a dry test tube and shaken well with distilled water. A little amount of the sample is shaken well with con HCl and then Con.H_2SO_4. Test sample Solubility was observed.

pH Value:

Potentiometrically pH value was determined by a glass electrode and a suitable pH meter. The pH of the *Mandoora vadagam* tablet was written in results column.

4.2.2 STANDADIZATION AS PER MODERN ASPECT

4.2.3.PHYSICO CHEMICAL ANALYSIS

a. Loss On Drying (Indian Pharmocoepia, 1996)

Loss on drying is the loss in percentage w/w resulting from water and volatile matter of any kind that can be driven off under a specified condition. A glass stopper, shallow weighing bottle was weighed accurately and the quantity of the sample as specified was transferred to the bottle was weighed accurately and the quantity of the sample as specified was transferred to the bottle covered and weighed. The sample was distributed evenly and the bottle was placed in the drying chamber. The sample was then dried for a specific period of time, and the bottle was removed from the chamber and allowed to cool at room temperature in a desiccators before weighing.

b. Total ash:

Two grams of ground air dried powder of *MANDOORA VADAGAM* was accurately weighed in a previously ignited and tared silica crucible. The drug was gradually ignited by raising the temperature to 450^{o}C until it was white. The sample was cooled in a desiccators and weighed. The percentage of total ash was calculated with reference to air-dried drug.

i)Acid insoluble ash

The ash was boiled with 25ml of 2M hydrochloric acid for 5 minutes, the insoluble matter was collected on an ash less filter paper, washed with hot water, ignited cooled in a desiccators, and weighed. The percentage of acid insoluble ash calculated with reference to the air-dried drug.

ii)Water soluble extractive

Proceed as directed for the determination of Alcohol-soluble extractive , using chloroform water instead of ethanol.

iii)Alcohol soluble extractive

Macerate 5g of the air dried drug, coarsely powdered, with 100 ml of alcohol of the specified strength in a closed flask for 24 hrs, shaking frequently during six hours and allowing to stand for eighteen hours. Filter rapidly, taking precautions against loss of solvent, evaporate 25 ml of the filtrate to dryness in a tared flat bottomed shallow dish, and dry at 105^{o} to constant weight. Calculate the percentage of alcohol-soluble extractive with reference to the air-dried drug.

c. Tablet disintegration test:

Each *MANDOORA VADAGAM* tablet was placed in each of the six tubes of the basket present in the disintegration apparatus. The apparatus was operated by using water as the immersion fluid maintained at 35-39 °C. At the end of the 30 min, the basket is lifted from the fluid and the state of the tablet is observed. The disintegration time of *Mandoora vadagam* was recorded.(Loher Dr).

d. Microbial Limit Test of Mandoora Vadagam

Evaluation of Total Aerobic Bacterial Count

1.1. Preparation of Sample for Experimental Work

Weighed 10 gm of the homogenized drug sample aseptically and dissolved in 10 ml of sterile water and made up to 100 ml with the sterile water. The insoluble drug product was suspended in 100 ml of buffered sodium chloride-peptone solution (pH 7.0).

1.2. Serial dilution of Sample

A serial dilution is the dilution of a sample, in 10-fold dilutions. From the sample, 1 ml of the sample was added to 9 ml of sterile distilled water and mixed it well. This dilution was denoted as 10^{-1} dilution. From this dilution, one ml was taken from that mixture is added to 9 ml, and designated as 10^{-2} dilution. The same procedure was repeated up to 10^{-4}.

1.3. Isolation of Total Viable Aerobic Microbial Count

1.3.1. Isolation of Bacteria by Plate Count Method

In this test, the bacteria in sample were made to grow as colonies, by inoculating a known volume of sample into a solidifiable nutrient medium (Casein Soybean Digest agar or Nutrient agar medium) in petridish. The agar plate was prepared by mixing growth medium with agar and then sterilized by autoclaving. Once the agar was cooled to 45^{o}C, approximately 15 to 20 ml of medium was poured into a sterile Petri dish under aseptic condition and left to solidify for 15 minutes. After solidification, each plate was smear with 0.1 ml of sample from the dilution of 10^{-1} and 10^{-2}. After inoculations, all the plates were incubated at 37^{o}C for 24 hours. After incubation, the bacterial colonies were developed as visible to the naked eye and the number of colonies on a plate was counted using Quebec Colony Counter. Plates with an average of from 30 to 300 colonies of the target bacterium were selected for colony count. Because of the statistical problems, plates with lower than 30 colonies greater than 300 colonies were rejected**.**

1.3.1.1. Composition of Nutrient Agar Media

Peptone	: 5.0 gm
Sodium chloride	: 5.0 gm
Beef extract	: 1.5 gm

Yeast extract	: 1.5 gm
Agar	: 15.0 gm
Distilled water	: 1000 ml
pH (at 25°C)	: 7.4±0.2

1.3.2. Isolation of Fungi

From each of the above prepared samples, 0.1 ml of sample was transferred to Sabouraud Dextrose agar (SDA) prepared with Chloramphenicol. The plates were then incubated for 5 days at room temperature (20 to 25°C). After incubation, the fungal colonies were observed and calculated.

1.3.2.1. Composition of SDA

Dextrose	; 40 gm
Peptone	: 10 gm
Agar	: 15 gm
Distilled water	: 1000 ml

1.5. Evaluation of Specified Microorganisms

1.5.1. Isolation & Identification of *Escherichia coli*

One ml of the prepared sample was added in a sterile screw-capped container containing 50 ml of nutrient broth and mixed well. Then, it was allowed to stand for 1 hour and mixed well again. After one hour, the screw caps of the bottle was loosened and incubated at 37º for 18 to 24 hours.

1.5.1.2. Primary Test

From the above prepared enrichment culture, 1.0 ml was taken and transferred aseptically into a tube containing 5 ml of Mac- Conkey broth. Inoculated tubes were incubated in a water-bath at 36º to 38º for 48 hours.

1.5.1.3. Secondary Test

From the primary test, 1.0 ml of the enrichment culture was taken and transferred aseptically in to 5 ml of peptone water. It was then incubated in a water-bath at 43.5º to 44.5º C for 24 hours and observed the tubes for acid and gas. Then,

the culture was subjected to biochemical tests of imvic and the results were observed and correlated.

1.5.1.4. Alternative test

It was done by a loop full of enriched culture in the primary test was streaked on a sterile Mac-Conkey agar medium. Then, the plates were inverted and incubated at 37 º C for 24 hours. After incubation, the pink or brick red color colonies were examined and transfer them individually into the surface of Eosin Methylene Blue agar medium (EMB), on Petri dishes. Inoculated plates were inverted and incubated at 37 º C for 24 hours. After incubation, the colonies on medium were checked for their color appearance like green metallic sheen under reflected light. The colonies were subjected to confirmation by further suitable cultural and biochemical tests.

1.5.1.5. Components of Eosin Methylene Blue Agar Media

Pancreatic digest of gelatin	: 10.0 g
Dibasic potassium phosphate	: 2.0 g
Lactose	: 10.0 g
Eosin Y	: 400 mg
Methylene blue	: 65 mg
Agar	: 15.0 g
Distilled water	: 1000 ml

1.5.2. Isolation & Identification of *Salmonella* sp.

One ml of the prepared sample was added in a sterile screw-capped container containing 100 ml of nutrient broth and mixed well. Then, it was allowed to stand for 1 hour and mixed well again. After one hour, the screw caps of the bottle was loosened and incubated at 37º for 18 to 24 hours.

1.5.2.1. Primary Test

From the above prepared enrichment culture, 1.0 ml was taken and transferred aseptically into a tube containing 10 ml of Selenite F broth. Inoculated tubes were incubated in a water-bath at 36º to 38º for 48 hours. After incubation, the culture was subcultured on two of the agar media namely Bismuth sulphate agar and Deoxy

cholate citrate agar and incubated the plates at 36º to 38º for 18 to 24 hours. After incubation, colonies were observed on the medium and confirmed the genus *Salmonella* based on guidelines.

1.5.2.2. Secondary test

The suspected colonies of the primary test were subcultured on the slant of triple sugar-iron agar in test tube and in urea broth. Both media were incubated at 37ºC for 24 hours. After incubation, the results were observed according to the development of color change and acid / gas in media. The presence of Salmonella was confirmed by agglutination tests.

1.5.2.3. Composition of *Salmonella Shigella* Agar Media

Beef Extract	: 5.0 gm
Enzymatic Digest of Casein	: 2.5 g
Enzymatic Digest of Animal Tissue	: 2.5 gm
Lactose	: 10 gm
Bile salts	: 8.5 gm
Sodium Citrate	: 8.5 gm
Ferric Citrate	: 1.0 gm
Brilliant Green	: 0.00033 gm
Neutral Red	: 0.025
Agar	: 13.5 gm
Distilled water	: 1000 ml

1.5.3. Isolation and Identification of *Pseudomonas aeruginosa*

From the above prepared enrichment culture, 1.0 ml was taken and transferred aseptically into 100 ml of fluid soyabean-casein digest medium and mixed well. The inoculated tubes were incubated at 37º C for 24 hours. After incubation, the growth of bacteria was checked. From this, a loop full of culture was streaked on the surface of Cetrimide agar medium and Pseudomonas Isolation Agar medium and incubated at incubated at 37º C for 24 hours. After incubation, the colonies from the agar surface of these two media were checked for detection of fluorescein and pyocyanin.

1.5.3.1. Composition of Cetrimide Agar Media

Pancreatic digest of gelatin	: 20.0 g
Magnesium chloride	: 1.4 g
Potassium sulphate	: 10.0 g
Cetrimide	: 0.3 g
Agar	: 13.6 g
Glycerin	: 10.0 g
Distilled Water t	: 1000 ml

1.5.4. Isolation and Identification of *Staphylococcus aureus*

From the above prepared enrichment culture, a loop full of culture was taken and transferred aseptically on Mannitol salt agar and incubated at 37º C for 24 hours.. After incubation, the colonies were subjected to confirmation by hem agglutination test.

1.5.4.1. Composition of Mannitol Salt Agar Media

Pancreatic digest of gelatin	: 5.0 g
Peptic digest of animal tissue	: 5.0 g
Beef extract	: 1.0 g
D-Mannitol	: 10.0 g
Sodium chloride	: 75.0 g
Agar	: 15.0 g
Phenol red	: 25 mg
Distilled Water	: 1000 ml

4.2.4. BIO CHEMICAL ANALYSIS:

Preliminary basic and acidic radical studies:

Preparation of the extract:

5gms of the test drug is weighed accurately and placed in a 250ml clean beaker. Then 50ml of distilled water is added and dissolved well. Then it is boiled well for about 10 minutes. It is cooled and filtered in a 100ml volumetric flask and then it is made up to 100ml with distilled water. This preparation is used for the qualitative analysis of acidic/ basic radicals and biochemical constituents in it.

Qualitative analysis for basic radicals:

Test for Calcium:

2ml of the above prepared extract is taken in a clean test tube. To this add 2ml of 4% Ammonium oxalate solution. Formation of white precipitate indicates the presence of calcium.

Test for Iron (Ferric):

The extract is acidified with glacial acetic acid and potassium ferro cyanide. Formation of blue colour indicates the presence of ferric iron.

Test for Iron (Ferrous):

The extract is treated with concentrated Nitric acid and ammonium thio-cyanate solution. Formation of blood red colour indicates the presence of ferrous iron.

Test for Zinc:

The extract is treated with potassium ferro-cyanide. Formation of white precipitate indicates the presence of zinc.

Qualitative analysis for acidic radicals:

Test for Sulphate:

2ml of extract is added to 5% barium chloride solution. Formation of white precipitate indicates the presence of sulphate.

Test for Chloride:

The extract is treated with silver nitrate solution. Formation of white precipitate indicates the presence of chloride.

Test for Phosphate:

The extract is treated with ammonium molybdate and concentrated nitric acid. Formation of yellow precipitate indicates the presence of phosphate.

Test for Carbonate:

On treating the extract with concentrated hydrochloric acid giving brisk effervescence indicates the presence of carbonate.

Test for starch:

The extract is added with weak iodine solution. Formation of blue colour indicates the presence of starch.

Test for albumin:

The extract is treated with Esbach`s reagent. Formation of yellow precipitate indicates the presence of albumin.

Test for tannic acid:

The extract is treated with ferric chloride. Formation of bluish black precipitate indicates the presence of tannic acid.

Test for unsaturation:

The extract is treated with potassium permanganate solution. The dis-colourization of potassium permanganate indicates the presence of unsaturated compounds.

Test for the reducing sugar:

5ml of Benedict`s qualitative solution is taken in a test tube and allowed to boil for 2 minutes and added 8-10 drops of the extract and again boil it for 2 minutes. Any colour change indicates the presence of reducing sugar.

Test for amino acid:

One or two drops of the extract is placed on a filter paper and dried it well. After drying, 1% Ninhydrin is sprayed over the same and dried it well. Formation of violet colour indicates the presence of amino acid.

4.2.5. PHYTOCHEMICAL ANALYSIS

PHYTOCHEMICAL ANALYSIS OF THE SIDDHA PREPARATION *MANDOORA VADAGAM*

The siddha preparation *Mandoora vadagaml* was prepared and used for phytochemical analysis.

Preliminary test, on the siddha preparation carried out in *Mandoora vadagam* was for the presence of alkaloids, carbohydrates, glycosides, phytosterols, saponins, tannins, phenolic compounds, proteins and free amino acids, flavanoids, lignin, fixed oils and fats. The methods adopted for the estimation are as follows:

1. Test for Alkaloids (Evans, 1997)

A small segment of the siddha preparation *Mandoora vadagam* was mixed separately with a few drops of dilute hydrochloric acid and filtered. The filtrates were tested carefully with various alkaloidal reagents as follows:

a) **Mayer's test** (Evans, 1997):

To a few ml of filtrate, a drop of Mayer's reagent is added by the side of the test tube. A white or creamy precipitate indicates that the test as positive.

b) **Hager's test** (Wagner *et al*., 1996):

To a few ml of filtrate, one to 2ml of Hager's reagent is added. A prominent yellow precipitate indicates the test as positive.

c) **Dragendorff's test** (Waldi, 1965):

To a few ml of filtrate, one to 2ml of Dragendorff's reagent is added. A prominent yellow precipitate indicates the test as positive.

2. Test for Carbohydrates (Ramakrishnan *et al*., 1994)

A small quantity of siddha preparation *Mandoora vadagam* was dissolved separately in 5ml of distilled water and filtered. The filtrate was subjected to Molisch's test to detect the presence of carbohydrates. Filtrate was treated with 2-3 drops of 1% alcoholic alpha naphthol solution and 2ml of concentrated sulphuric acid was added along the sides of the test tube. Appearance of brown ring at the junction of 2 layers shows the presence of carbohydrates.

3.Test for Glycosides

The siddha preparation *Mandoora vadagam* was hydrolyzed with hydrochloric acid for few hours on a water bath and the hydrolysate was subjected to Legal's and Borntrager's test to detect the presence of different glycosides.

(a) Legal's Test:

To the hydrolysate, one ml of pyridine and few drops of sodium nitro prusside solution were added and then it was made alkaline with sodium hydroxide solution. Appearance of pink to red color shows the presence of glycosides and aglycones.

(b) Borntrager's Test:

Hydrolysate was treated with chloroform and the chloroform layer was separated. To this equal quantity of dilute ammonia solution was added. Ammoniacal layer acquires pink color, shows the presence of glycosides (Evans, 1997).

4.Test for Phytosterols (Finar, 1986)

(a) **Liebermann Burchard Test:**

Small amount of the siddha preparation *Mandoora vadagam* was dissolved with 3ml of acetic anhydride, a few drops of glacial acetic acid and followed by the addition of few drops of concentrated sulphuric acid. Appearance of bluish green color shows the presence of phytosterols.

(b) **Salkowski Test:**

Small quantities of the siddha preparation *Mandoora vadagam* were dissolved in chloroform separately. This chloroform solution was added with few drops of concentrated sulphuric acid. The appearance of bluish green color shows the presence of phytosterols.

5.Test for Saponins (Kokate, 1999)

(a). Frothing Test:

The siddha preparation *Mandoora vadagam* was diluted separately with 20ml of distilled water and it was agitated on a graduated cylinder for 15min. Absence of the foam formation shows the devoid of saponins.

6.Test for Phenolic Compounds and Tannins (Mace, 1963)

Small quantities of siddha preparation *Mandoora vadagam* was dissolved separately in water and tested for the presence of phenolic compound and tannins. In the process of testing and treating, the following observations were noted:

a) Dilute ferric chloride solution (5%) gives a dark green color. 38

b) 10% aqueous potassium dichromate solution gives yellowish brown precipitate.

c) 10% lead acetate solution gives a white precipitate.

7. Test for Proteins and Free Amino Acids (Fisher, 1968; Ruthmann, 1970)

Small quantities of various siddha preparation *Mandoora vadagam* was dissolved in few ml of water and the following reaction were carried out

a) Millon's Test :

To 2ml of filtrate, few drops of Millon's reagent were added. A white precipitate indicates the presence of proteins (Rasch and Swift, 1960).

b) Ninhydrin Test:

To 2ml of filtrate 2 drops of ninhydrin solution was added. A characteristic purple color indicates the presence of amino acids (Yasma and Ichikawa, 1953).

d) Biuret Test:

An aliquot of 2ml of filtrate was treated with a drop of 2% copper sulphate solution. To this, 1ml of ethanol (95%) was added, followed by excess of potassium hydroxide pellets, Pink color in the ethanol layer indicates the presence of protein (Gahan, 1984).

8.Test for Flavanoids

(a) **Shinoda's Test:**

Small quantity of siddha preparation *Mandoora vadagam* was treated with alcohol, to that a piece of magnesium was added followed by an addition of concentrated hydrochloric acid drop wise and heated. Appearance of magenta color shows the presence of flavanoids (Harborne, 1984).

b)**Florescence Test:**

Small quantity of *Mandoora vadagam* was dissolved separately in alcohol and a drop of that extract was placed on Whatman filter paper and observed under UV light. Florescence indicates the presence of flavanoids.

9.Tests for Lignin

Small quantities of *Mandoora vadagam* was dissolved separately in few ml of alcoholic solution of hydrochloric acid and phloroglucinol gives red color, which shows lignin is present.

10.Tests for Fixed oils and Fats

(a) **Spot Test:**

A small quantity of siddha preparation *Mandoora vadagam* was placed between 2 filter papers. Oil stains produced with any extract shows the presence of fats and fixed oils in the *Mandoora vadagam* (Harborne, 1984).

(b) **Saponification Test:**

A small quantity of siddha preparation *Mandoora vadagam* was treated with few drops of 0.5N alcoholic potassium hydroxide along with 2 to 3 drops of phenolphthalein. Later the mixture is refluxed for about 2h. Soap formation indicates the presence of fats and fixed oils in the *Mandoora vadagam*..

4.2.6. INSTRUMENTAL ANALYSIS

SCANNING ELECTRON MICROSCOPE (SEM)

Fig 1 :Scanning Electron Microscope

The microstructure of the powder was examined using a Hitachi S 3000H scanning electron microscope

Introduction:

The scanning Electron Microscope is one of the most versatile instruments available for the examination and analysis of the micro structural characteristics of solid objects. The primary reason for the SEM's usefulness is the high resolution which can be obtained when bulk objects are examined; values of the order of 5nm (50degreeA) are usually quoted for commercial instruments. Advanced research instruments have been described which have achieved resolutions of about 2.5nm (25 degree A). Any solid material can be studied. Sample size is limited to specimens less than about 10μm in diameter.

Principle:

The beam is then rastered over the specimen in synchronism with the beam of a cathode ray tube display screen. The elastically scattered secondary electrons are emitted from the sample surface and collected by a scintillator, the signal from which is used to modulate the brightness of the cathode ray tube. In this way the secondary electron emission from the sample is used to form an image on the CRT display screen. (Goldstein, et. al., 1992)

Sem Mechanism

Procedure:

An electron beam passing through an evacuated column is focused by electromagnetic lenses onto the specimen surface. Since an electron is a charged particle, it has a strong interaction with the specimen (due to coulomb interaction).So when an electron beam images on a specimen, it is scattered by atomic layers near the surface of the specimen. As a result, the direction of electron motion changes and its energy is partially lost. Once an incident electron (primary electron) enters a substance, its direction of motion is influenced by various obstructions (multiple scattering), and follows a complicated trajectory which is far from a straight line. Also, when electrons with the same energy are incident on the specimen surface, a portion of electrons is reflected in the opposite direction (back scattered) and the remainder is absorbed by the specimen (exciting X- rays or other quanta in the process). If the specimen is sufficiently thin, the electron can pass all the way through the specimen (transmitted electrons, scattered or non-scattered).

The depth at which various signals are generated due to electron beam – specimen interaction indicates the diffusion area of the signals in the specimen in addition to the local chemistry of the specimen. Secondary electrons mainly indicate information about the surface of a specimen. Since secondary electrons do not diffuse much inside the specimen, they are most suitable for observing the fine-structures of the specimen surface. That is to say, sharp scanning images with high resolution can be expected from secondary electrons, because of the smaller influence on resolution by their diffusion.

As the incident electron energy increases, the probability of incident electrons

Colliding with elemental components of the specimen and releasing secondary electrons also increases. In other words, as the incident energy increases, the emission of electrons from the specimen also increases. However, as the energy increases beyond a certain level, the incident electrons penetrate deeper into the specimen with the result that the specimen derived electrons use up most of their energy to reach the specimen surface. Consequently, the electron emission yield decreases. Therefore, the peak secondary electron emission yield occurs at a specific entry level of the incident electrons.

In order to verify the existence of a substance and recognize its shape, the image contrast must be well defined. In other words, even if a system boasts

extremely high resolution, if image contrast is poor, it would be extremely difficult to determine the existence of a substance, let alone recognize its shape. Another important feature of the SEM is the three-dimensional appearance of the specimen image, which is a direct result of the large depth of field.

Applications:

The SEM is capable of examining objects at very low magnification. This feature is useful in viewing particle size and shape of any composition at various stages of preparation in *Siddha* system as well as other fields. The large depth of field available in the SEM makes it possible to observe 3-dimensional objects in stereo. Today, a majority of SEM facilities are equipped with X-ray analytical capabilities. Thus topographic crystallographic and compositional information can be obtained rapidly, efficiently and simultaneously from the same area.

The author was chosen this analysis for detecting Particle size of the classical *Siddha* herbo-mineral drug *Mandoora Vadagam,* SEM results of *Mandoora vadagam* were represented in results section.

FOURIER TRANSFORM-INFRA RED SPECTROSCOPY (FT-IR)

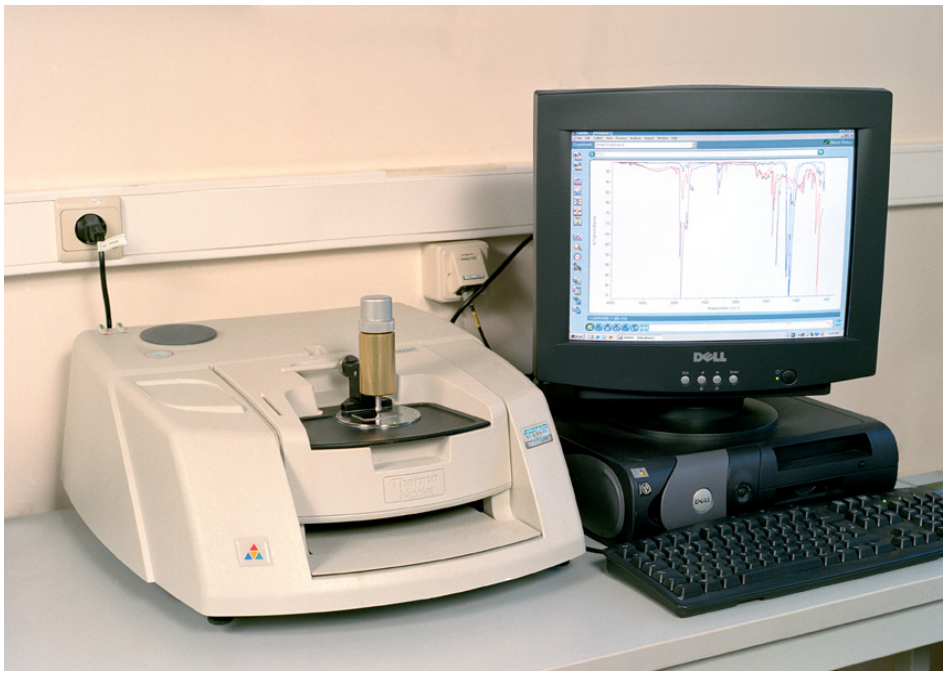


Fig.2 Fourier Transform-Infra Red spectroscopy (FT-IR)

Introduction:

Vibrational spectroscopy is an extremely useful tool in the elucidations of molecular structure .The spectral bands can be assigned to different vibrational modes of the molecule. The various functional groups present in the molecule can be assigned by a comparison of the spectra with characteristic functional group frequencies. As the positions of the bands are directly related to the strength of the chemical bond, a large number of investigations including intermolecular interactions, phase transitions and chemical kinetics can be carried out using this branch of spectroscopy. In IR spectroscopy, the resonance absorption is made possible by the change in dipole moment accompanying the vibrational transition. The Infrared spectrum originates from the vibrational motion of the molecule. The vibrational frequencies are a kind of fingerprint of the compounds. This property is used for characterization of organic, inorganic and biological compounds. The band intensities are proportional to the concentration of the compound and hence qualitative estimations are possible. The IR spectroscopy is carried out by using Fourier transform technique.

Principle:

Infra red spectroscopy involves study of the interaction of electromagnetic radiation with matter. Due to this interaction, electromagnetic radiation characteristic of the interacting system may be absorbed (or emitted). The experimental data consist of the nature (frequency of wave length) and the amount (intensity) of the characteristic radiation absorbed or emitted. These data are correlated with the molecular and electronic structure of the substance and with intra- and inter molecular interactions.

Source	:	Nernst Glower
Beam splitter	:	It is made up of a transparent material. Thin films of Silicon deposited on Potassium bromide (KBr) Bromide (KBr) Detectors: Deutrated TriGlycine Sulphate (DTGS).
Scan Range	:	MIR 450to 4000 cm^{-1}
Resolution	:	4.0 cm^{-1}
Sample required	:	50mg, solid or liquid
Sampling Techniques:		There are a variety of techniques for sample preparation physical form of the sample to be analyzed.
Solid	:	KBr or Nujol mull method.
Liquid	:	Csl / TIBr Cells
Gas	:	Gas cells

Measurements Techniques:

The procedure for recording the %T or %A is as follows:

1. Air is first scanned for the reference and stored. The sample is then recorded and finally the ratio of the sample and reference data is computed to give required %T or %A at various frequencies.
2. Study of substances with strong absorbance bands and weak absorbance bands as well as possible.
3. Small amount of samples are sufficient
4. High resolution is obtained

Procedure:

Typically,1.5 mg of protein, dissolved in the buffer used for its purification, were centrifuged in a 30 K Centric on micro concentrator (Amicon) at 3000 g at 4ºC until a volume of approximately 40 Al.

1. Then, 300 Al of 20 mM buffer, prepared in H_20 or $2H_20$, pH or p2H 7.2, were added and the sample concentrated again. The p2H value corresponds to the pH
2. meter reading + 0.4. The concentration and dilution procedure was repeated several times in order to completely replace the original buffer with this buffer.
3. The washings took 24 h, which is the time of contact of the protein with the $2H_2O$
4. medium prior FT-IR analysis. In the last washing, the protein was concentrated to fine a volume of approximately 40 Al and used for the infrared measurements.
5. The concentrated protein sample was placed in CaF2 windows and a 6 Am tin spacer or a 25 Am Teflon spacer for the experiments in H_2O or $2H_2O$, respectively. FT-IR spectra were recorded by means of a Perkin-Elmer - Spectrum-1 FT-IR spectrometer using a deuteratedtriglycinesulfate detector.
6. At least 24 h before, and during data acquisition, the spectrometer were continuously purged with dry air at a dew point of 40^oC. Spectra of buffers and samples were acquired at 2 cm^{-1} resolution under the same scanning and temperature conditions. In the thermal denaturation experiments, the temperature was raised in 5^oC steps from 20 to 95^oC.
7. Before spectrum acquisition, samples were maintained at the desired temperature for the time necessary for the stabilization of temperature inside the cell (6 min).Spectra were collected and processed using the SPECTRUM software from Perkin-Elmer. Correct subtraction of H_20 was judged to yield an approximately flat baseline at 1900-1400 cm^{-1}, and subtraction of $2H_20$ was adjusted to the removal of the$2H_20$ bending absorption close to 1220 cm^{-1}

KBr Method

1. The sample is grounded using an agate mortar and pestle to give a very fine powder.
2. The finely powder sample is then mixed with about 100mg dried KBr salt.

3. The mixture is then pressed under hydraulic press using a die to yield a transparent disc and measure about 13mm diameter and 0.3mm in thickness.
4. **Nujol Mull Method:**

1. The sample is ground using an agate mortar and pestle to give a very fine powder.
2. A small amount is then mixed with nujol oil to give a paste and this paste is then applied between two sodium chloride plates.
3. The plates are then placed in the instrument sample holder ready for scanning.

Liquids:

1. Viscous liquids can be smeared in the cell and directly measured.
2. For dilute solutions, liquid cells and variable path length cells are employed.

Applications:

Infrared spectrum is useful in identifying the functional groups like -OH, -CN, -CO, -CH, -NH2, etc. Also quantitative estimation is possible in certain cases for chemicals, pharmaceuticals, petroleum products, etc. Resins from industries, water and rubber samples can be analyzed.

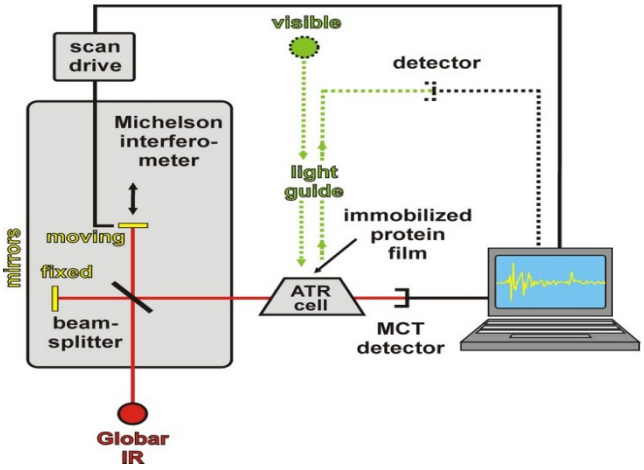


Fig.3.Mechanism of FTIR analysis

Analytical Capabilities:

1. Identifies chemical bond functional groups by the absorption of infrared radiation which excites vibrational modes in the bond.
2. Especially capable of identifying the chemical bonds of organic materials
3. Detects and identifies organic contaminants.
4. Identifies water, phosphates, sulphates, nitrates, nitrites, and ammonium ions
5. Detection limits vary greatly, but are sometimes $<10^{13}$ bonds/cm^3 or sometimes sub monolayer .Useful with solids, liquids, or gases.

INDUCTIVELY COUPLED PLASMA OPTICAL EMISSION SPECTROMETRY(ICP-OES)

Fig.4 Inductively Coupled Plasma Optical Emission Spectrometric

Introduction:

Inductively coupled plasma optical emission spectrometry (ICP-OES) is an analytical technique used for the detection of trace metals. It is a type of emission spectroscopy that uses the inductively coupled plasma to produce excited atoms and ions that emit electromagnetic radiation at wavelengths characteristic of a particular element. The intensity of this emission is indicative of the concentration of the element within the sample.

Mechanism:

The ICP-OES is composed of two parts: ICP and the optical spectrometer. The ICP torch consists of 3 concentric quartz glass tubes. The output or "work" coil of the radiofrequency (RF) generator surrounds part of this quartz torch. Argon gas is typically used to create the plasma.

When the torch is turned on, an intense electromagnetic field is created within the coil by the high power radio frequency signal flowing in the coil. This RF signal is created by the RF generator which is, effectively, a high power radio transmitter driving the "workcoil" the same way a typical radio transmitter drives a transmitting antenna. The argon gas flowing through the torch is ignited with a Tesla unit that creates a brief discharge arc through the argon flow to initiate the ionization process. Once the plasma is "ignited", the Tesla unit is turned off.

The argon gas is ionized in the intense electromagnetic field and flows in a particular rotationally symmetrical pattern towards the magnetic field of the RF coil. Stable, high temperature plasma of about 7000 K is then generated as the result of the inelastic collisions created between the neutral argon atoms and the charged particles. A peristaltic pump delivers an aqueous or organic sample into a nebulizer where it is changed into mist and introduced directly inside the plasma flame. The sample immediately collides with the electrons and charged ions in the plasma and is itself broken down into charged ions. The various molecules break up into their respective atoms which then lose electrons and recombine repeatedly in the plasma, giving off radiation at the characteristic wavelengths of the elements involved.

Within the optical chamber(s), after the light is separated into its different wavelengths (colours), the light intensity is measured with a photomultiplier tube or tubes physically positioned to "view" the specific wavelength(s) for each element line involved, or, in more modern units, the separated colours fall upon an array of semiconductor photo detectors such as charge coupled devices (CCDs). In units using these detector arrays, the intensities of all wavelengths (within the system's range) can be measured simultaneously, allowing the instrument to analyse for every element to which the unit is sensitive all at once. Thus, samples can be analysed very quickly.

The intensity of each line is then compared to previously measured intensities of known concentrations of the elements and their concentrations are then computed by interpolation along the calibration lines. In addition, special software generally corrects for interferences caused by the presence of different elements within a given sample matrix.

Applications :

ICP-OES is used in the determination of metals, arsenic present in Traditional medicines, and trace elements bound to proteins. ICP-OES is widely used in minerals processing to provide the data on grades of various streams, for the construction of mass balances.

The author used it for elemental identification and quantitative compositional information of the *Mandoora vadagam* **.**

X-RAY POWDER DIFFRACTION

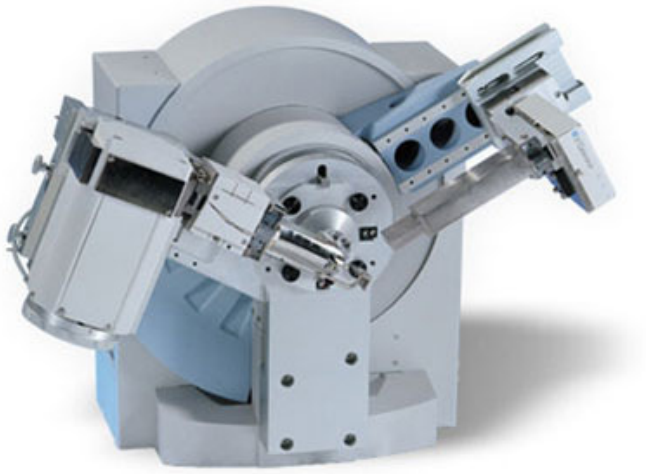


Fig 5: X- Ray powder diffraction

X-ray powder diffraction(XRD) is a rapid analytical technique primarily used for phase identification of a crystalline material and can provide information on unit cell dimensions the analyzed material is finely ground, homogenized, and average bulk composition is determined. Max von Laue, in 1912, discovered that crystalline substance act as three dimensional diffraction gratings for x-ray wavelengths similar to spacing of plants in a crystal lattice. X-ray diffraction is now a common technique for the study of crystal structures and atomic spacing

X-ray diffraction is based on constructive interference of monochromatic X-rays and a crystalline sample. These X-rays are generated by a cathode ray tube, filtered to produce monochromatic radiation, collimated to concentrate, and directed toward the sample. The interaction of the incident rays with the sample produces concentrative interference(and diffracted ray) when conditions satisfy Bragg's Law(nX=2d sin9). This law relates the wavelength of electromagnetic radiation to the diffraction angle and the lattice spacing in a crystalline sample. these diffracted X-rays are then detected, processed and counted. By scanning the sample through a range of 29 angles, all possible diffraction directions of the lattice should be attained due to the random orientation of the powdered material. Conversion of the diffraction peaks to d-spacing. Typically, this is achieved by comparison of d-spacing with standard reference patterns.

All diffraction methods are based on generation of x-rays in a x-ray tube these x-rays are directed at the sample, and the diffracted rays are collected. A key

component of all diffraction is the angle between the incident and diffracted rays. Powder and single crystal diffraction vary in instrumentation beyond this.

X-ray powder diffraction(XRD) instrumentation

X-ray diffractometer consist of three basic elements: an X-rative, a sample holder and an x-ray detector

X-rays are generated in a cathode ray tube by heating a filament to produce electrons, accelerating the electrons toward a target by applying a voltage, and bombarding the target material with electrons. When electrons have sufficient energy to dislodge inner shell electrons of the target material, characteristics X-ray spectra are produced. These spectra consist of several components, the most common being Ka and Kp. Ka consists, in part, of Ka1 and Ka2. Ka1 has, as lightly shorter wavelength and twice the intensity as Ka2. The specific wavelength are characteristic of the target material(Cu, Fe, Cr). Filtering, by foils or crystal monochrometers, is required to produce monochromatic X- rays needed for diffraction. Ka1 and Ka2 are sufficiently close in wavelength such that a weighted average of the two is used. Copper is the most common target material for single – crystal diffraction, with CuKa radiation = 1.5418A. these X-rays are collimated and directed onto the sample. As the sample and detector are rotated, the intensity of the reflected X-rays is recorded. When the geometry of the incident X- rays impinging the sample satisfies the Bragg Equation, constrictive interference occurs and a peak in intensity occurs. A detector records and processes this X-ray signal and converts the signal to a count rate which is then output to a device such as a printer or computer monitor.

The geometry of an X- ray diffractometer is such that the sample rotates in the path of the collimated X- ray beam at an angle 9 while the X-ray detector is mounted on an arm to collect the diffracted X-rays and rotates at an angle of 29. The instrument used to maintain the angle and rotate the sample is termed a goniometer. For typical powder patterns, data is collected at 29 from -5° to 70°, angle that are present in the X-ray scan

Applications

X-ray powder diffraction is most widely used for the identification of unknown crystalline materials (e.g. minerals, inorganic compounds). Determination of unknown solids is critical to studies in geology, environmental science, material science, engineering and biology.

Other applications include:

Characterization of crystalline materials.

Identification of fine-grained minerals such as clays and mixed layer clays that are difficult to determine optically.

Determination of unit cell dimensions.

Measurement of sample purity.

With specialized techniques, XRD can be used to:

Determine crystal structures using Rietveld refinement.

Determine of modal amounts of minerals (quantitative analysis)

Characterize thin film samples by:

Determining lattice mismatch between film and substrate and to inferring stress and strain.

Determining dislocation density and quality of the film by rocking curve measurements.

Measuring superlattices in multilayered epitaxial structures.

Determining the thickness, roughness and density of the film using glancing incidence X-ray reflectivity measurements.

Make textural measurements, such as the orientation of grains, in a polycrystalline sample.

Strengths and Limitation of X-ray Power Diffraction (XRD)

Powerful and rapid (<20 min) technique for identification of an unknown mineral.

In most cases, it provides an unambiguous mineral determination.

Mineral sample preparation is required.

XRD units are widely available.

Data interpretation is relatively straight forward.

Limitations:

Homogenous and single phase material is best for identification of an unknown.

Must have access to standard reference file of inorganic compounds (d-spacing, hkls).

Requires tenths of a gram of material which must be ground into a powder.

For mixed materials, detection limit is 2% of sample.

For unit cell determination, indexing of patterns for non-isometric crystal systems is complicated.

Peak overload may occur and worsens for high angle 'reflections'.

User's guide – Sample Collection and Preparation.

Determination of an unknown requires the material, an instrument for grinding, and a sample holder.

Obtain a few tenths of a gram (or more) of the material, as pure as possible.

Grind the sample to a fine powder, typically in a fluid to minimize including extra strain (surface energy) that can offset peak positions, and to randomize orientation. Powder less than ~10^{2} m (or 200 mesh) in size is preferred.

Place into a sample holder or onto the sample surface.

Packing of fine powder into a sample holder.

Smear uniformly onto a glass slide, assuring a flat upper surface.

Pack into a sample container.

Sprinkle on double sticky tape.

Typically the substrate is amorphous to avoid interference.

Care must be taken to create a flat upper surface and to achieve a random distribution of lattice orientations unless creating an oriented smear.

For analysis of clays which require a single orientation,specialized techniques for preparation of clay samples are given by usages.

For unit cell determinations, a small amount of a standard with known peak positions (that do not interfere with the sample) can be added and used to correct peak positions.

Data collection, Results and Presentation:

Data Collection:

The intensity of diffracted X-rays is continuously recorded as the sample and detector rotate through their respective angles. A peak in intensity occurs when the mineral contains lattice planes with d - spacing appropriate to diffract X-rays at that value of 9. Although each peak consists of two separate reflections (ka1 and ka2), at small values of 29 the peak locations overlap with ka2 appearing as a hump on the side of ka1. Greater separation occi=urs at higher values of 9. Typically these combined peaks are treated as one. The 21 position of the diffraction peak is typically measured as the center of the peak at 80%peak height.

Data Reduction:

Results are commonly presented as peak positions at 29 and X-ray counts(intensity) in the form of an x-y plot. Intensity (I) is either reported as peak height intensity, that intensity above background, or as integrated intensity, the area under the peak. The relative intensity is recorded as the ratio of the peak intensity to that of the most intense peak (relative intensity = 1/11×100).

Determination of an unknown:

The d-spacing of each peak is then obtained by solution of the Bragg equation for the appropriate value of 1. Once all d-spacing have been determined, automated search match routines compare the d-spacing of the unknown to those of unknown materials. Because each mineral has a unique set of d-spacing, matching these d-spacing provides an identification of the unknown sample. A systemic procedure is used by entering the d-spacing in terms of their intensity beginning with the most intense peak. Files of d-spacing for hundreds of thousands of inorganic compounds are available from the International Centre for Diffraction Data as the Powder Diffraction file (PDF). Many other sites contain d-spacing of minerals such as the American Mineralogist Crystal Structure Database. Commonly this information is an integral portion of the software that comes with the instrumentation.

4.3. TOXICOLOGICAL STUDIES

4.3.1. ACUTE TOXICITY STUDY OF MV IN FEMALE WISTER ALBINO RATS

Objectives:

The aim of this Study is to evaluate the toxicity of the test substance *Mandoora vadagam* when administered orally to Female Wister Rats with different doses, so as to provide a rational base for the evaluation of the toxicological risk to man and indicate potential target organs.

Guidelines followed*:*

OECD Guidelines No. 423,

Study Design and Controls*:*

1. Female Wister Rats in controlled age and body weight were selected.
2. ***The test drug MV*** was administered at **5 mg/kg, 10 mg/kg,300 mg/kg, 1000 mg/kg, and 2000 mg/kg** body weight of animal as suspension along with water.
3. The results were recorded on day 0, with single oral dosing period of 14 days.

Experimental procedure

1.Animals

1.1 Supply

A total of 15 Female Wister Rats with an approximate age of 6 weeks and purchased from Trivandrum medical college, Trivandrum. On their arrival a sample of animals was chosen at random and weighed to ensure compliance with the age requested. The mean weights of Female Wister Rats were 100-150 g respectively. The animals were housed in metabolic cages (55 x 32.7 x 19 cm), with sawdust litter, in such a way that each cage contained a maximum of 3 animals of the same sex.

All animals underwent a period of 20 days of observation and acclimatization between the date of arrival and the start of treatment. During the course of this period, the animals were inspected by a veterinary surgeon to ensure that they fulfilled the health requirements necessary for initiation of the Study.

Housing:

The Female Wister Rats were housed in metabolic cages (55 x 32.7 x 19 cm), placed On racks. From the week before initiation of the treatment, each cage contained a maximum of 3 rats of the same sex and treatment group.

Each cage was identified by a card, color coded according to the dose level. This card stated the cage number, number and sex of the animals it contained, Study number, test substance code, administration route, dose level and Study Director's name, date of the arrival of the animals and initiation of treatment.

The temperature and relative humidity were continuously monitored. Lighting was controlled to supply 12 hours of light (7:00 to 19:00 hours) and 12 hours of dark for each 24-hour period.

The cages corresponding to each experimental group were distributed on racks in such a manner that external factors, such as environmental conditions, were balanced as far as possible.

2.Diet

All the rats had free access to a pelleted rat diet. The diet was analyzed by the manufacturer to check its composition and to detect possible contaminants.

2.1. Water

The water was offered ad libitum in bottles.

3. Numbering and Identification

The animals were marked on body with picric acid solution prepared in water. The marking within the cage was as below.

Table no-2 Numbering and Identification

Group No.	Animal Marking
1	Head
2	Body
3	Tail

Numbering and Identification

Cage No	Group No	Animal Marking	Sex
1	I	H,B,T	Female
2.	II	H,B,T	Female
3	III	H,B,T	Female
4	IV	H,B,T	Female
5	V	H,B,T	Female

The group no., cage no., sex of the animal and animal no. were identified as indicated below using cage label and body marking on the animals

4. Administration Route And Procedure

The test substance was administered orally. The Female Wister Rats belonging to the control group were treated with the vehicle (Water) at the same administration volume as the rest of the treatment groups.

4.1. Doses

The doses for the study were selected based on literature search and range finding study. Following the period of fasting, the animals were weighed and then drug was administered orally as single dose using a needle fitted onto a disposable syringe of approximate size at the following different doses.

Doses

GROUP	DOSE
Group-I	5 mg/kg
Group-II	50 mg/kg
Group-III	300 mg/kg
Group-IV	1000 mg/kg
Group-V	2000 mg/kg

The test item was administered as single dose. After single dose administration period, all animals were observed for 14days.

4.2.Dose Preparation

Mandoora vadagam was added in distilled water and completely dissolved to form oral for administration. The dose was prepared of a required concentration

before dosing by dissolving, in distilled water. It was mixed well. The preparation for different doses was vary in concentrations to allow a constant dosage volume.

4.3. Administration

The test item was administered orally to each Female Wister rats as single dose using a needle fitted onto a disposable syringe of appropriate size at the following different doses. The concentration was adjusted according to its body weight. The volume was not exceeding 10 ml/kg bodyweight. Variability in test volume was minimized by adjusting the concentration to ensure a constant volume at all dose levels.

4.4.Observation period

All animals were observed for any abnormal clinical signs and behavioral changes. The appearance, change and disappearance of these clinical signs, if any, were recorded for approximately 1.0, 3.0 and 4.0 hours post-dose on day of dosing and once daily thereafter for14 days. Animals in pain or showing severe signs of distress were humanely killed. The cageside observation was included changes in skin, fur, eyes and mucous membranes, occurrence of secretions and excretions. Autonomic activity like lacrimation, piloerection, pupil size and unusual respiratory pattern, changes in gait, posture, response to handling, presence of clonic or tonic movements, stereotypes like excessive grooming and repetitive circling or bizarre behavior like self-mutilation, walking backwards etc were observed. At the 14th day, sensory reactivity to stimuli of different types (e.g. auditory, visual and proprioceptive stimuli) was conducted. Auditory stimuli responses were measured by clicker sound from approximately 30 cm to the rats; visual stimuli response were measured with the help of shining pen light in the eye of rats and placing a blunt object near to the eye of rats. Response to proprioceptive stimuli was measured by placing anterior/dorsal surface of animals paw to the table edge. The responses of reactions for these three exercises were normal in animals belonging to both the controls as well as drug treatment dose groups.

4.5.Mortality and Morbidity

All animals were observed daily once for mortality and morbidity at approximately 1.0, 3.0 and 4.0 hours post dose on day of dosing and once daily there after for 14 days.

4.3.2. SUBACUTE (REPEATED DOSE) TOXICITY STUDY OF *MANDOORA VADAGAM* IN WISTER ALBINO RATS

1. Objective

The objective of this '**Sub-Acute Toxicity Study of MV on Wister Rats**' was to assess the toxicological profile of the test item when treated as a single dose daily for 28 days Animals should be observed for 28 days This study provides information on the possible health hazards likely to arise from exposure over a relatively limited period of time.

2.Test Guideline Followed

OECD 407 Method - (Repeated Dose 28-Day Oral Toxicity Study in Rodents)

3. Test Item Detail

Mandoora vadagam

4.Test System Detail

The study was conducted on 3 male 3female Wister rats for each group. These animals were selected because of the recommended rodent species for oral studies as per followed guideline and availability of Animals 8-12 weeks old male and female rats were selected after physical and behavioral examination. The body weight range was fallen within ± 20% of the mean body weight at the time of Randomization and grouping. The rats were housed in standard laboratory condition in Polypropylene cages, provided with food and water *adlibitum* in the Animal at Trivandrum medical college, Trivandrum.. The experimental protocol was approved by Institutional Animal Ethical Committee as per the guidance of Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA), Ministry of Environment and Forest, government of India.

5. Acclimatization

The animals were selected after veterinary examination by the veterinarian. All the selected animals were kept under acclimatization for a week.

6.Randomization & grouping

One day before the initiation of treatment (days 0- last day of acclimatization), the selected animals were randomly grouped into three different groups containing minimum 5 male and 5 female animals per group.

7.Numbering and Identification

The animals were marked on body with picric acid solution prepared in water. The marking within the cage was as below.

Table no-3 Numbering and Identification

Cage No	ml/kg Group No& CONCENTRATION/DOSE	Animal Marking	Sex	No. Of Animals
1.	CONTROL	H,B,T, HB, NM H, B,T, HB, NM	Male Female	5 5
2.	LOW DOSE OF MV 200 mg/kg	H,B,T, HB, NM H, B,T, HB, NM	Male Female	5 5
3.	MIDDLE DOSE OF MV 400 mg/kg	H,B,T, HB, NM H, B,T, HB, NM	Male Female	5 5
4.	HIGH DOSE OF MV 600 mg/kg	H,B,T, HB, NM H, B,T, HB, NM	Male Female	5 5

The group *no*., cage no., sex of the animal and animal no. were identified as indicated below using cage label and body marking on the Above.

8. Husbandry

8.1 Housing

The Wister rats were housed in standard polypropylene cages with stainless steel top grill. Paddy husk was used as bedding. The paddy husk was changed at least twice in a week. From the week before initiation of the treatment, each cage contained a maximum of 10 rat of the different sex and treatment group.

8.2 Environmental conditions

The animals were kept in a clean environment with 12 hour light and 12 hour dark cycles. The air was conditioned at 22 ± 3^{0}C and the relative humidity was maintained between 30-70% with 100% exhaust facility. The cages corresponding to each experimental group were distributed on racks in such a manner that external factors, such as environmental conditions, were balanced as far as possible.

8.3 Feed & feeding schedule:

Arulmigu kalasalingam university, krishnankoil. Feed was provided adlibitum throughout the study period, except over night fasting (18-20 hours) prior to dose administration. After the substance has been administered, food was with held for a further 3-4 hours.

8.4 Water

The water was offered adlibitum in bottles. There was periodically analyzed to detect the presence of possible contaminants

8.5 Doses

The doses for the study were selected based on literature search and range finding study. Following the period of fasting, the animals were weighed and then extract was administered orally as single dose using a needle fitted on to a disposable syringe of approximate size at the following different doses.

Dose Preparation

MV was added in distilled water and completely dissolved for oral administration. The dose was prepared of a required concentration before dosing by dissolving **MV** in distilled water. It was mixed well. The preparation for different doses was vary in concentrations to allow a constant dosage volume.

8.6 Administration

The test item was administered orally to each rat as single dose using a needle fitted on to a disposable syringe of appropriate size at the following different doses. The concentration was adjusted according to its body weight. The volume was not exceeding 10 ml/kg body weight. Variability in test volume was minimized by adjusting the concentration to ensure a constant volume at all dose levels.

9. OBSERVATIONS

These observations were also performed on week-ends. The observations included but were not limited to changes in skin and fur, in the eyes and mucous membranes, in the respiratory, circulatory, central nervous and autonomous systems, somatomotor activity and behavior.

9.1. Clinical signs of toxicity

All the rats were observed at least twice daily with the purpose of recording any symptoms of ill- health or behavioral changes. Clinical signs of toxicity daily for 28 days.

9.2. Food intake

Prior to the beginning of treatment, and daily, the food intake of each cage was recorded for period of 28 days and the mean weekly intake per rats was calculated.

9.3. Water intake

Water intake was checked by visual observation during the Study. In addition, the water consumption in each cage was measured daily for a period of 28 days.

9.4 Bodyweight:

The body weight of each rat was recorded one week before the start of treatment, and during the course of the treatment on the day of initial, 3rd, 7th, 10th, 14th, 17th, 20th, 24th and 28th days (day of sacrifice). The mean weights for the different groups and sexes were calculated from the individual weights.

Blood Collection Blood was collected through retro-orbital sinus from all the animals of different groups on 28th day. The blood was collected in tubes containing Heparin/EDTA as an anticoagulant. Animals were fasted over night prior to the blood collection.

Laboratory Studies

During the 4th week of treatment, samples of blood were withdrawn from the orbital sinus of 6 rats from each group, under light ether anesthesia after fasting for 16 hours. The blood samples are used to evaluate Hematological parameters like RBC, WBC, HB, PCV, POLYMORPHS, LYMPHOCYTES, MONOCYTES, EOSINOPHILIS, MCH. The collected blood samples also centrifuged 10000 rpm in 10 minutes to separate the serum. The separated serum used to evaluate biochemical parameters like SGOT, SGPT, ALP and BILIRUBIN, CREATININE, URIC ACID.

Terminal Studies

Sacrifice and macroscopic examination

On completion of the 4 weeks of treatment, 24 Wister rats were sacrificed by ether inhalation. A full autopsy was performed on all animals which included examination of the external surface of the body, all orifices, cranial, thoracic and abdominal cavities and their contents both in situ and after evisceration. As the number of animals exceeded the number that could be sacrificed in one day, the autopsies were carried out over three consecutive days at the end of the treatment period.

Organ weight:

After the macroscopic examination the following organs were weighed after separating the superficial fat: Brain, Heart, Spleen Kidneys, Testes, Liver, Lungs, pancreas and stomach.

4.4. PHARMACOLOGICAL STUDIES

4.4.1. EVALUATION OF HAEMATINIC ACTIVITY OF *MANDOORA VADAGAM* IN PHENYLHYDRAZINE INDUCED ANAEMIC RATS [IN VIVO STUDY]

Aim:

The present study was taken upto evaluate the haematinic activity of *Mandoora vadagam a*gainst phenylhydrazine induced anaemic rats.

Animals:

Albino rats of either sex weighing about 180-200 g were obtained from animal house of department of pharmacology, Arulmigu Kalasalingam university, krishnankoil.The rats were acclimated to standard laboratory conditions (temperature and maintained on 12 h light / dark cycles. All the rats were provided with standard food and free access to water adlibitum. This present study was approved by the institutional animal ethical committee(IAEC).

Experimental design for haematinic activity:

Animals were divided into 5 groups with 6 rats in each. Six rats were kept as normal group (Group 1 below),white 30 rats were made anaemic by oral intubations of phenylhydrazine (10 mg/kg) body weight daily for 8 days. Rats that developed anaemia with hemoglobin concentration <14g/dl were recruited for the study. Anaemic rats were randomly divided into 4 groups (2-5 below, 6 rats per group), and treated as follows:

Group 1: Received distilled water (1ml/daily) (normal control)

Group 2: Received distill water (1ml/daily) (anemic control)

Group 3: Received standard drug Haematinic syrup

Group4: Received oral single dose (200 mg/kg) of siddha formulation MV

Group 5: Received oral single dose (400 mg/kg) of siddha formulation MV

Haematological investigation:

Blood was collected from the animals from intital phase (pre treatment) , after one week and two weeks (during and post treatment)by puncture of retro orbital vein. To analyse the haematinic potential of *siddha* formulation *Mandoora vadagam* with different doses and standard drug. The hematological parameters were assessed which

included Hb concentration, packed cell volume (PCV), Total red blood cells (TRBC), Mean corpuscular volue (MCV), Mean cell haemoglobin (MCH), Mean corpuscular hemoglobin concentration(MCHC) and compared with normal control and anemic control.

Statistical analysis:

Results of the present study were statistically analysed and expressed as mean +- SEM by using one way ANOVA followed by new mann keuls multiple range tests. *P< 0.05; *P<0.01 when compared to normal and anemic control groups.

4.4.2. EVALUATION OF HEPATOPROTECTIVE ACTIVITY OF *MANDOORA VADAGAM* AGAINST (INH+RIF) INDUCED HEPATOTOXICTY IN WISTER ALBINO RATS [IN VIVO STUDY]

In traditional medicines,various herbal preparation are being used for treating liver disorders. In the absence of an effective treatment in modern medicine, efforts are being made to find out suitable herbal drugs.In previous work we have reported the on activity of moringaoleifera(1), Caseriaecsulenta(2) and Orthosiphonthymiflorus(3) against paracetamol induced hepatotoxicity. The present study was taken up to evaluate the effects of of *M V* ()against Isoniazid and Rifampicin induced hepatotoxicity.

Animals and treatment:

Male wistar rats (180-200 gm) were supplied by experimental animal centre, Kalasalingam University, Krishnankovil. Throughout the study, rats were housed in temperature – controlled rooms with 12h light – dark cycle, and were free access to food and water.

For hepatotoxicity model, 100 mg/kg per day of INH and RIF each was used in the study(4) INH and RIF solution were prepared separately in sterile distilled water. Rats were treated with INH, co-administered with RIF for 21 days. For the hepatoprotective model, 200 mg/kg per day of ethanolic extract and400 mg/kg ethanolic extract along with INH+RIF solution was administered.

Treatment protocol:

Group I	:	Normal control the animals were given normal saline only.
Group II	:	Hepatotoxicitycontrol the animals were given INH+RIF for 21days.
Group III	:	Standard group the animals were given INH+RIF+SILYMARIN orallyfor 21 days.
Group IV	:	Treatment group the animals were given INH+RIF+ *M V* (200 mg/kg orally for 21 days).
Group V	:	Treatment group the animals were given INH+RIF+Ethanolic extracts of *M V* (400 mg/kg) for 21 days).

Method:

Rats were treated as per the treatment protocol. The protocol was approved by the institute's animal ethical committee. In the present study hepatoprotective activity was evaluated biochemically and histopathologically. On day 21the rats were anaesthetized and sacrificed 1 h after administration drug. The blood was collected by retro-orbital plexus method; the serum was separated by centrifugation and used for the estimation of

1. Serum alkaline phosphatase, ALP.
2. Serum AST (S.G.O.T).
3. Serum ALT (S.G.P.T).
4. Total protein and Albumin.
5. Serum cholesterol.

The liver was carefully isolated preserved is 10% formalin. The weight of each liver was recorded and then subjected to histopathological study.

EVALUATION OF ANTIOXIDANT ACTIVITY OF *MANDOORA VADAGAM* THROUGH DPPH (2, 2-DIPHENYL 1-2 PICRYLHYDRAZYL) ASSAY

The antioxidant activity of *MV* was determined using the 2, 2-diphenyl-1 picrylhydrazyl (DPPH) free radical scavenging assay.100µl of *MV* extract was mixed with 2.7ml of methanol and then 200µl of 0.1 % methanolic DPPH was added. The suspension was incubated for 30 minutes in dark condition. Initially, absorption of blank sample containing the same amount of methanol and DPPH solution was prepared and measured as a control subsequently, at every 5 min interval, the absorption maximum of the solutions were measured using a UV double beam spectra scan (Chemito, India) at 517nm. The antioxidant activity of the sample was compared with known synthetic standard of 0.16% Butylated Hydroxy Toluene (BHT). The experiment was carried out in triplicates

Free radical scavenging activity was calculated by the following formula:

$$\% \text{ Inhibition} = \frac{\text{Abs of Control} - \text{Abs of Test}}{\text{Abs of Control}} \times 100$$

5. MICROBIOLOGICAL ANALYSIS

Aim

To study the Antimicrobial action of "Mandoora vadagam" done by "Agar well diffusion method" – Kirby – bauyermethod.

Components of Muller Hinton agar medium

Beef extract	-	300gms/lit
Agar	-	17 gms/lit
Starch	-	1.5 gms/lit
Casein Hydrolysate	-	17.5 gms/lit
Distilled water	-	1000 ml
PH	-	7.6

Procedure:

The method of antibacterial activity study is UPS Diffusion Method. Antibiotic discs are prepared with known concentration of antibiotic are placed on agar plates that has been inoculated with the known pathogenic micro organism. The antibiotic diffuses through the agar producing an antibiotic concentration, gradient antimicrobial susceptibility is proportional to the diameter of the inhibitory zone around the disc. If the microorganism which grows up to the edge of the disc are resistant to the antimicrobial agent. The recommended medium in this method is Muller Hinton Agar, its PH should be between 7.2-7.6 and should be poured to uniform thickness of 4mm in the petri plate (25ml).

Methodology:

Muller Hinton Agar plates are prepared *Escherichia coli*, *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa* and *Candida sp* is inoculated separately.

The prepared disc of *Mandoora vadagam* are placed over the incubated plate using sterile forceps and incubated for 24 hours at 37 degree celcius. The plates after 24 hours incubation are observed for the zone of inhibition.

6. RESULTS AND DISCUSSION

6.1. STANDARDISATION OF

MANDOORA VADAGAM

The test drug ***Mandoora vadagam*** had been subjected to various studies to establish the works of Siddhar`s to be true. Literary collections, physico-chemical and elemental analysis, pharmacological study, toxicological study and antimicrobial study are done to prove the activity of ***Mandoora vadagam*** as an haematinic, hepato protective and Anti-oxidant activities.

Table – 4 Physico Chemical Standardisation.

SL. NO.	PARA METER	RESULTS
1.	Organo leptic characters	
	a. Color	Black
	b. Odour	Pungent odour
	c. Sense of touch	Hard
	d. Appearance	Round
	e. Taste	Astringent, pungent
1.	Physico chemical standard	
	a. Loss on drying at 70°C	7.10 % (5-8%)
	b. Ash	
	i. Total ash	8.25%
	ii. Acid insoluble ash	0.80 %
	iii. Water soluble	8.55 %
	c. Extractive value	
	i. Ethanol soluble extractive	21.1 %
	ii. Water soluble extractive	9.30 %
	d. pH value (1% solution)	7.640

Interpretation:

The physical parameters like colour, odour touch, appearance revealed that *Mandoora vadagam* is a Black, Pungent odour, having the PH 7.640 slightly alkaline Ph.

Microbial Limit Tests

Results of Microbial Contamination Test

S.No.	Test Particulars	Colony Counts (CFU/ g)	Limits Value (CFU/g)
1.	Total Viable Aerobic Bacterial Count	4×10^2	1×10^5
2.	Total Viable Fungal Count	3.5×10^2	1×10^3

Results of Specific Pathogens Test

S.No.	Test for Specified Pathogens	Colony Counts (CFU/ g)	Limits Value (CFU/g)
1.	*Salmonella* sp.	No growth	-
2.	*Staphylococcus aureus*	No growth	-
3.	*Escherichia coli*	No growth	-
4.	*Pseudomonas aeruginosa*	No growth	-

Determination of loss of drying normal:

The loss of drying test is designed to measure the amount of volatile matters in a sample when the sample is dried under specified conditions moisture is one of the major factors. Responsible for the deterioration of the drugs and formulations low moisture content is always desirable for higher stability of days.

The percentage of loss on drying was within acceptable range (5-8%) thus implying that the formulation can be stored for a long period and would not easily be attacked by microbes.

Interpretation

The total bacterial count and the total fungal count of the drug were found to be within the WHO prescribed limits which indicate that the drug is free from microbial contamination. The other pathogens like Escherichia coli, Salmonella sps, Pseudomonas aeruginosa and Staphylococcus aureus were found to be completely absent in the drugs.

Total Ash:

Ash values are helpful in determining the quality and purity of crude drugs. in this trial drug *MANDOORA VADAGAM* (The minerals that present in the trial drug

are calcium, chloride, sulphate). The salts, Ca+, Cl-, Sulphate are not harmful one. In this trial drug *MANDOORA VADAGAM* is used as a condensation from water extraction . So only water soluble trace elements present here in a very few trace levels. Total ash was 8.25%.

Acid insoluble Ash:

Acid insoluble ash values represents detecting the presence of silica and oxalate in a drugs. In my drug the silica and oxalate that is the acid insoluble ash is very low on 0.80 ± 0.011. So the drug has high quality.

Water soluble ash:

Water soluble ash also indicate the purity of the drug water soluble ash higher than acid insoluble ash represents good quality of the drug which is *MANDOORA VADAGAM* is 8.55 %. So water soluble ash is higher than acid insoluble ash.

b) Water soluble extractive

Proceed as directed for the determination of Alcohol-soluble extractive , using chloroform water instead of ethanol water soluble extractive Mandoora vadagam is 9.30 %.

c) Alcohol soluble extractive

Macerate 5g of the air dried drug, coarsely powdered, with 100ml of alcohol of the specified strength in a closed flask for 24 hrs, shaking frequently during six hours and allowing to stand for eighteen hours. Filter rapidly, taking precautions against loss of solvent, evaporate 25 ml of the filtrate to dryness in a tared flat bottomed shallow dish, and dry at 105^{o},to constant weight and weigh. Calculate the percentage of alcohol-soluble extractive with reference to the air-dried drug. Alcohol soluble extractive Mandoora vadagam is 21.1%.

d) Determination of pH

5 gms of *Mandoora vadagam* was weighted accurately and placed in clear 100ml beaker. Then 50ml of distilled water was added to it and dissolved well. after 30 minutes it was then applied into pH meter at standard buffer solution of 4.0, 7.0 and 9.0. Repeat the test 4 times and average was recorded. The pH of Mandoora vadagam is 7.640.

Disintegration:

The disintegration of test sample under the specifications not more than 15 minutes. In the present analysis the *MANDOORA VADAGAM* disintegration on only 10m 50 sec.

CHEMICAL ANALYSIS

Table – 5 Results of Preliminary test for basic and acidic radicals

S.NO	EXPERIMENT	INFERENCE
1.	Test for Calcium	**Present**
2.	Test for Sulphate	**Present**
3.	Test for Chloride	**Present**
4.	Test for Carbonate	Absent
5.	Test for Starch	**Present**
6.	Test for Ferric Iron	Absent
7.	Test for Ferrous Iron	**Present**
8.	Test for Phosphate	Absent
9.	Test for Albumin	Absent
10.	Test for Tannic Acid	Absent
11.	Test for Unsaturated Compounds	**Present**
12.	Test for Reducing Sugar	Absent
13.	Test for Amino Acid	**Present**
14.	Test for Zinc	Absent

Interpretation:

The biochemical analysis of *Mandoora vadagam* contains the following chemical constituents, Sulphate, Chloride, Starch, Ferrous iron, Unsaturated compound, Reducing sugar, Tannic acid and Amino acid.

Calcium:

- Calcium along with phosphate is required for the formation (of hydroxyapatite) and physical strenth of skeletal tissue.
- Bones which are in a dynamic state serve as reservoir of cell.
- Muscle contraction: Ca^{2+} interacts with troponin C to trigger muscle contraction. Calcium also activates ATP ase, increases the interaction between actin and myosin.
- Nerve transmission: Ca^{2+} is necessary for the transmission of nerve impulse.
- Activation of enzymes: Ca^{2+} is needed for the direct activation of enzymes such as lipase, ATP ase and succinate dehydrogenase.

Sulphate:

Ferrous sulphate: Ferrous sulphate is an essential body mineral terrous sulphate is used to treat iron deficiency anaemia (a lack of red blood cells caused by having too little iron in the body).

Starch:

Starches functions much like dietary fibre. They provide nutrition for the beneficial bacteria in the colon, keeping them thriving and health. Dietary fibre in starch reduces effects of haemorrhoids, diverticulosis & controls blood pressure.

Ferrous iron :

- Iron is used for synthesis of hemoglobin.
- Ferrous form is soluble and readily through intestine.
- In iron deficiency anaemia Fe absorption is increased to 2-10 times that of normal.

Chloride:

- Calcium- activated chloride channels (Ca-Cl) are thought to regulate neuronal excitability.
- Chloride forms the chief anion of the extracellular fluid and exists along with sodium mostly.
- Regulates acid base balance.
- Formation of HCl in gastric juice.
- Help to preserve normal neuromuscular irritability by maintaining a state of equilibrium, on account of their relative proportion in ECF and ICF.

Unsaturated compound:

- A free phenolic hydroxyl group is essential for scavenging oxygen free-radicals and is also essential for inhibiting leukocyte chemotaxis. So it has anti oxidant property.

Amino acid:

- The globin part of the hemoglobin is a heme contain globular proteins.
- Amino acid which cannot be synthesized by the body and therefore need to be supplied through the diet are called essential amino acids.
- Proteins are polymers of amino acids of the 20 amino acids found in protein structure half of them (10) can be synthesized by man. About 10 essential amino acids have to provided through the diet.

PHYTOCHEMICAL STUDY OF *MANDOORA VADAGAM*

The *Mandoora vadagam* was subjected to qualitative chemical investigation Details of the various tests performed for the presence of phytoconstituents is shown in Table 7.

Table – 6 Phytochemical tests for *Mandoora vadagam*

Tests	***Mandoora vadagam***
Alkaloids	
Mayer's test	-ve
Dragendroff's test	-ve
Hager's test	-ve
Carbohydrates and glycosides	
Molisch test	+ve
Legal's test	-ve
Borntrager's test for anthraquinones	-ve
Phytosterols	
Liebermann-Burchard test	-ve
Salkowski test	-ve
Flavanoids	
Shinoda test Magnesium turnings and hydrochloric acid (Presence of red color)	-ve
Fluorescence test	-ve
Tannins	
Ferric chloride test	-ve
Potassium dichromate test	+ve
Lead acetate test	-ve
Proteins	
Millon's test	-ve
Biuret test	-ve
Ninhydrin test	-ve
Fixed oils and fats	

Spot test	-ve
Saponification test	+ve
Lignin	
Phloroglucinol test	-ve
Saponins	
Frothing test	-ve

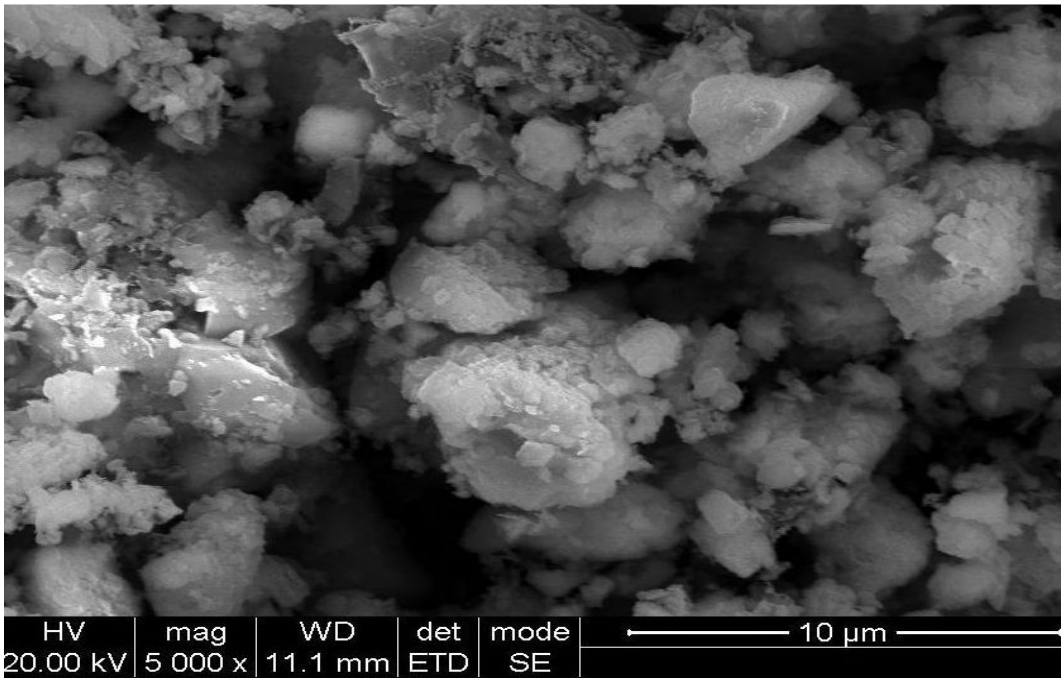
(+ve) indicates the presence of phytochemical, (-ve) indicates the absence of phytochemical.

Interpretation:

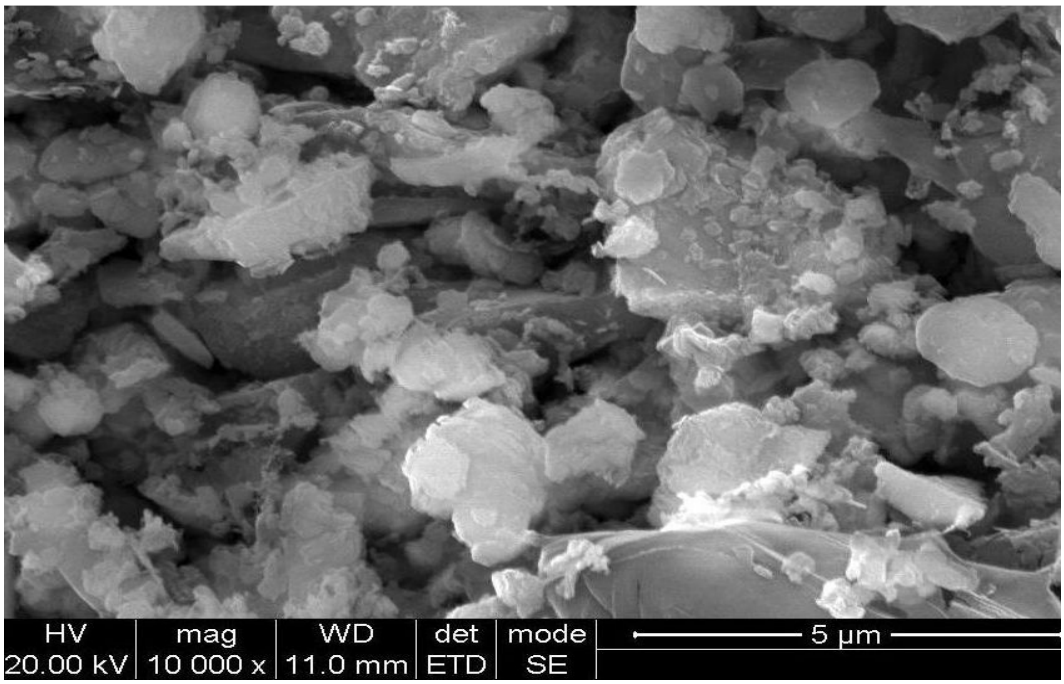
This study revealed the presence of active phytochemicals in Mandoora vadagam such as glycosides, tannins. Many plants glycosides are used as Medicines.

INSTRUMENTAL ANALYSIS

SCANNING ELECTRON MICROSCOPE (SEM)



SEM -5000 Magnification



SEM -10000 Magnification

Figure - 6 Showing SEM Results of Trial Drug

(MANDOORA VADAGAM)

Interpretation :

The morphology of the *Mandoora vadagam* samples can be determined by Environmental SEM (FEI Quanta). A representative portion of each sample must be sprinkled onto a double side carbon tape and mounted on aluminium stubs, in order to get a higher quality secondary electron image for SEM examination. The SEM photographs revealed that particles were spherical in shapes and sizes were in the range from 5µm to 10µm.Although the particle sizes of different batches showed similarity, it seems that these particles were aggregates of much smaller particles.

When dispersed in an aqueous medium, these preparations form a negatively charged hydrophobic particle suspension. This hydrophobicity gave these particles a tendency to aggregate together to form larger particles. ***Mandoora vadagam*** exhibited larger sizes and agglomeration of the particles. Therefore, the comparatively larger size may be due to the agglomeration of the particles by repeated cycles of calcinations involved in preparation. SEM analysis of the ***Mandoora vadagam*** shows most of the particles present in the sample are size is 5 - 10µm.

FOURIER TRANSFORM-INFRARED SPECTROSCOPY(FTIR)

Fourier Transform Infra-Red Spectroscopy (FTIR) analysis results in absorption spectra that provide information about the functional group and molecular structure of a material IR relates with the sample and the bonds among atoms in the molecule stretch and bend, absorbing infrared energy and creating the infrared spectrum. It is of two kinds of bending and stretching.

FT-IR is a very useful tool in the recognition of the functional groups of bio molecules, thus aiding in their structural elucidation, so confirming the presence of active molecules responsible for the therapeutic activity of Siddha drugs. The results of Table no: 8 and Fig no:10 shows the presence of functional group and inorganic compounds of ***Mandoora vadagam***

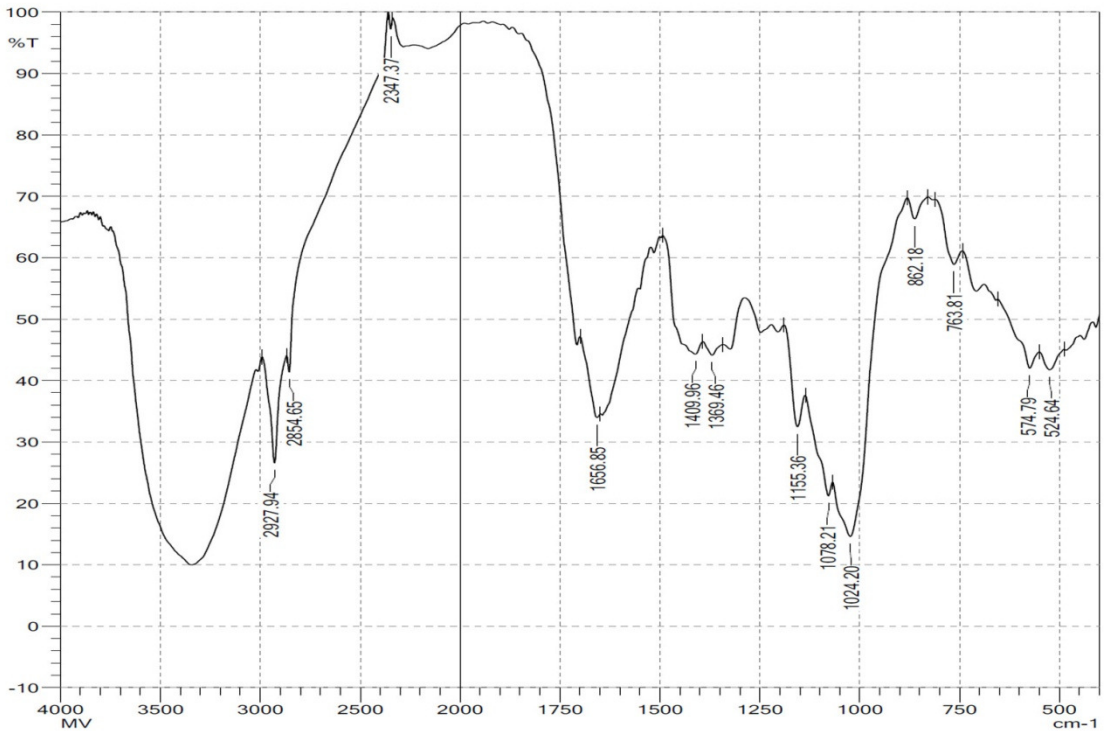


Figure -7 Showing FTIR Image of *MANDOORA VADAGAM*

Table – 7 Interpretation of FTIR Spectrum

S.No	Frequency	Bond	Functional Group
1.	2927.94	N-H stretch	Amine salt
2.	2854.65	C-H Stretch	Alkanes
3.	2347.37	O=C=O Stretch	Carbon- di-oxide
4.	1656.85	C=N Stretch	Imine/oxime
5.	1409.96	C-C Stretch	Aromatics
6.	1369.46	C-H Bend	Alkanes
7.	1155.36	C-O Stretch	Tertiary alcohol
8.	1078.21	C-N Stretch	Aliphatic amines
9.	1024.20	C-N Stretch	Amine
10.	862.18	C-H Bend	Aromatics
11.	763.81	C=C Bend	Alkane
12.	574.19	C-Cl Stretch	Halocompounds
13.	524.64	C- Br Stretch	Halocompounds

Interpretation:

1. FTIR instrumental analysis was done. The test drug was identified to have 20 peaks. They are the functional groups present in the trial drug *Mandoora vadagam.*
2. It confirms that *Mandoora vadagam* constitutes Amine salt, Alkanes, Carbon-di-oxide, Imine/oxime, Aromatics, Tertiary alcohol, Aliphatic amines, Amine, Halo compounds as functional groups.

   Amines: Acts as a neuro transmitter.Involved in protein synthesis.Amines play an important role in reducing abdominal pain,bloating.

   Alkanes: They protect against bacteria and fungal infections.

   Alcohols: Has anti microbial action.Acts as a antiseptic agent.

   Aromatics: These herbs have a strong and often pleasant odour. This oil-based aroma can stimulate the relax the body via the digestive and nervous system and are the basis for much of aromatherapy.

ICP-OES *(INDUCTIVELY COUPLED PLASMA OPTICAL EMISSION SPECTROSCOPY) RESULTS*

The drug *(Mandoora vadagam)* sample was analysed by the Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES) to detect the trace elements and other elements quantitatively. The result of ICP-OES is given on the Table.

ICP-OES of *Mandoora vadagam*.

S. No	Elements	Wavelength (nm)	Concentration
1.	Al	396.152	BDL
2.	As	188.979	BDL
3.	Ca	315.807	11.180mg/L
4.	Cd	228.802	BDL
5.	Cu	327.393	BDL
6.	Fe	238.204	601.376mg/L
7.	Hg	253.652	BDL
8.	K	766.491	13.871mg/L
9.	Mg	285.213	01.184mg/L
10.	Na	589.592	14.120mg/L
11.	Ni	231.604	BDL
12.	Pb	220.353	BDL
13.	P	213.617	186.341mg/L

BDL:Below Detectable Limit

Interpretation:

1. Optical Emission spectrometry is based on the principle that atoms or ions in an excited state tend, to revert back to the ground state and in so doing emit characteristic wavelength and intensity of that light is proportional to the concentration of that particular element in the sample solution.
2. This technique is used for quantitative and qualitative determination of the metals and mettaloids, in the biological preparation.
3. This results shows Below detection limit(BDL) of As(arsenic),Hg(Mercury), Cd (Cadmium), Pb(Lead), Ni(Nickel), Al(Aluminium), Cu (Copper).It is evident that the effectiveness of *siddha* medicine has been proved by the modern scientific way.
4. This result indicates the presence of Calcium, Ferrous, Magnesium, Potassium, Sodium, Phosphorus.

Calcium:

Calcium along with phosphate is required for the formation (of hydroxyapatite) and physical strenth of skeletal tissue.

Bones which are in a dynamic state serve as reservoir of cell.

Muscle contraction: Ca^{2+} interacts with troponin C to trigger muscle contraction. Calcium also activates ATP ase, increases the interaction between actin and myosin.

Nerve transmission: Ca^{2+} is necessary for the transmission of nerve impulse.

Activation of enzymes: Ca^{2+} is needed for the direct activation of enzymes such as lipase, ATP ase and succinate dehydrogenase.

Ferrous iron :

Iron is used for synthesis of hemoglobin.

Ferrous form is soluble and readily through intestine.

In iron deficiency anaemia Fe absorption is increased to 2-10 times that of normal.

Potassium :

Potassium maintain intracellular osmotic pressure

It is required for the regulation of acid-base balance and water balance in the cells.

The enzyme pyruvate kinase is dependent on K^+ for optimal activity.

Pottasium is required for the transmission of nerve impulse.

Adequate intracellular concentration K^+ is necessary for proper biosynthesis of proteins by ribosomes.

Magnesium :

Magnesium is required for the formation of bones and teeth.

Mg^{2+} serve as a cofactor for several enzymes requiring ATP e.g. hexokinase, glucokinase, phosphofructo kinase, adenylate cyclase.

Mg^{2+} is necessary for proper neuro muscular function. Low Mg^{2+} levels lead to neuromuscular irritability.

Sodium :

Sodium is an electrolyte that helps regulate the movement of water throughout the body. It also maintains the blood pressure and nerve and muscle function.

Phosphorus :

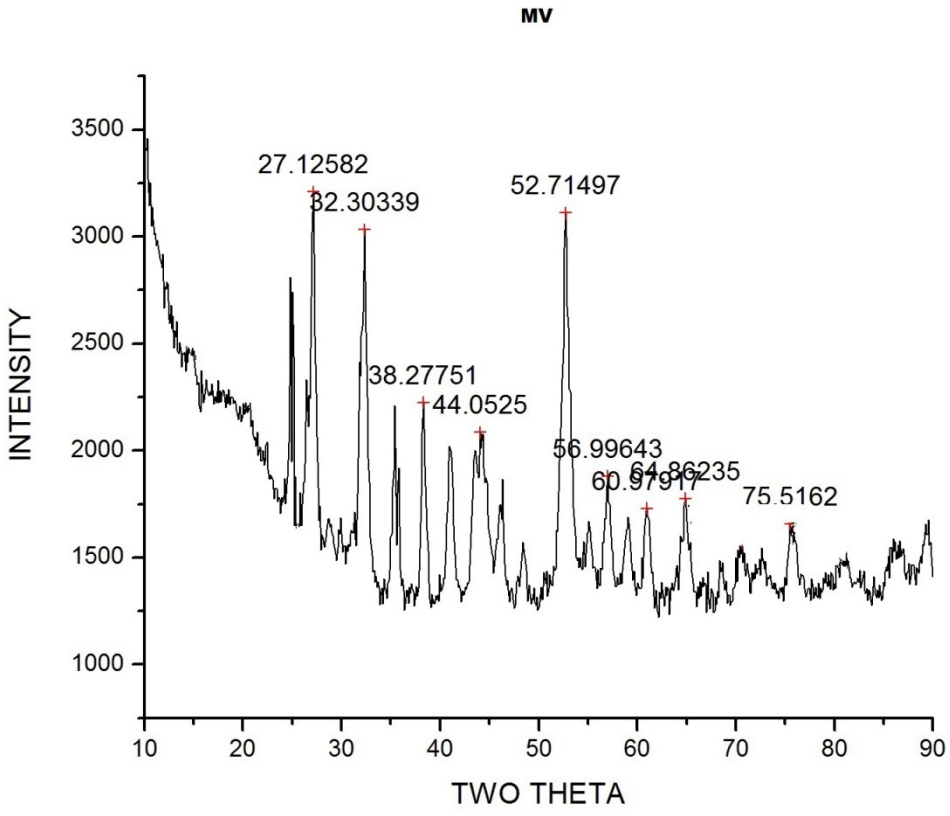
It plays a central role for the formation and utilization of high-energy phosphate compounds e.g. ATP, GTP, creatine phosphate etc.

Phosphorus is required for the formation of phospholipids, phospho proteins and nucleic acids (DNA & RNA)

XRD (X-Ray Diffraction):

X-Ray powder diffraction is a rapid analytical technique primarily used for phase identification of a crystalline material and can provide information on unit cell dimensions.

Fig. No. 8 XRD –Results of *MV*



This XRD finger print shows both the similarities and differences of the sample successfully and is a valuable primary tool for checking the quality control of Herbo-mineral formulations. The different peaks show the presence of minerals in the samples.

TOXICITY STUDIES

EVALUATION OF ACUTE TOXICITY STUDY OF *M V*

Effect of Acute Toxicity Study (14 Days) of *M V*

Table no –9 Physical and behavioral examinations.

Group no.	Dose(mg/kg)	Observation sign	No. of animal affected.
Group-I	5mg/kg	Normal	0 of 3
Group- II	50mg/kg	Normal	0 of 3
Group-III	300mg/kg	Normal	0 of 3
Group-IV	1000mg/kg	Normal	0 of 3
Group-V	2000mg/kg	Normal	0 of 3

Table no-10 Home cage activity

Functional and Behavioural observation	Observation	5mg/kg Group (G-I)	50mg/kg (G-II)	300mg/kg (G-III)	1000mg/kg (G-IV)	2000mg/kg (G-V)
		Female n=3	Female n=3	Female n=3	Female n=3	Female n=3
Body position	Normal	3	3	3	3	3
Respiration	Normal	3	3	3	3	3
Clonic involuntary Movement	Normal	3	3	3	3	3
Tonic involuntary Movement	Normal	3	3	3	3	3
Palpebral closure	Normal	3	3	3	3	3
Approach response	Normal	3	3	3	3	3
Touch response	Normal	3	3	3	3	3
Pinna reflex	Normal	3	3	3	3	3
Tail pinch response	Normal	3	3	3	3	3

Table no-11 Hand held observation

Functional and Behavioral observation	Observation	Control	5 mg/kg (G-I)	50 mg/kg (G-II)	300mg/kg (G-III)	1000mg/kg (G-IV)	2000mg/kg (G-V)
		Female n=3	Female n=3	Female n=3	Female n=3	Female n=3	Female n=3
Reactivity	Normal	3	3	3	3	3	3
Handling	Normal	3	3	3	3	3	3
Palpebral closure	Normal	3	3	3	3	3	3
Lacrimation	Normal	3	3	3	3	3	3
Salivation	Normal	3	3	3	3	3	3
Piloerection	Normal	3	3	3	3	3	3
Pupillary reflex	Normal	3	3	3	3	3	3
Abdominal tone	Normal	3	3	3	3	3	3
Limb tone	Normal	3	3	3	3	3	3

Table no-12 Mortality

Group no	Dosage	Mortality
Group-I	5(mg/kg)	0 of 3
Group-II	50(mg/kg)	0 of 3
Group-III	300(mg/kg)	0 of 3
Group-IV	1000(mg/kg)	0 of 3
Group-V	2000(mg/kg)	0 of 3

Result:

From acute toxicity study it was observed that the administration of *M V*at a dose of 2000 mg/kg to the rats do not produce drug-related toxicity and mortality. So No-Observed-Adverse-Effect- Level (NOAEL) of *M V*is 2000 mg/kg.

Discussion

M V was administered single time at the dose of 5mg/kg, 50mg/kg , 300mg/kg, 1000mg/kg and 2000mg/kg to rats and observed for consecutive 14 days after administration. Doses were selected based on the pilot study and literature review. All animals were observed daily once for any abnormal clinical signs. Weekly body weight and food consumption were recorded. No mortality was observed during the entire period of the study. Data obtained in this study indicated no significance physical and behavioural signs of any toxicity due to administration of ***M V*** at the doses of 5mg/kg, 50mg/kg , 300mg/kg, 1000mg/kg and 2000mg/kg to rats.

At the 14th day, all animals were observed for functional and behavioral examination. In functional and behavioral examination, home cage activity, hand held activity were observed. Home cage activities like Body position, Respiration, Clonic involuntary movement, Tonic involuntary movement, Palpebral closure, Approach response, Touch response, Pinna reflex, Sound responses, Tail pinch response were observed. Handheld activities like Reactivity, Handling, Palpebral closure, Lacrimation, Salivation, Piloercetion, Papillary reflex, abdominaltone, Limb tone were observed. Functional and behavioral examination was normal in all treated groups.Food consumption of all treated animals was found normal as compared to normalgroup.

Body weight at weekly interval was measured to find out the effect of ***M V*** on the growth rate. Body weight change in drug treated animals was found normal.

Interpretation:

M V was administered single time at the dose of 5mg/kg, 50mg/kg , 300mg/kg, 1000mg/kg and 2000mg/kg to rats and observed for consecutive 14 days after administration. Doses were selected based on the pilot study and literature review. All animals were observed daily once for any abnormal clinical signs. Weekly body weight and food consumption were recorded. No mortality was observed during the entire period of the study. Data obtained in this study indicated no significance physical and behaviou ral signs of any toxicity due to administration of ***M V*** at the doses of 5mg/kg, 50mg/kg , 300mg/kg, 1000mg/kg and 2000mg/kg to rats.

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Body weight at weekly interval was measured to find out the effect of ***M V*** on the growth rate. Body weight change in drug treated animals was found normal.

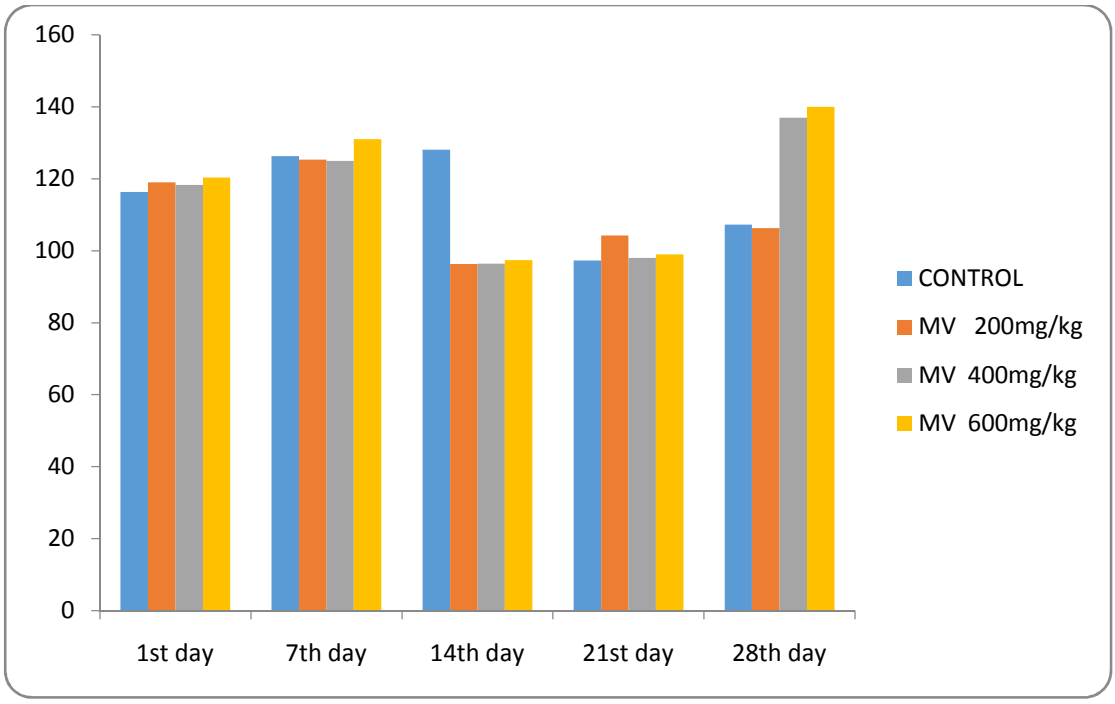
IC_{50} is commonly used as a measure of antagonist drug potency in pharmacological research. IC_{50} is comparable to other measures of potency, such as IC_{50} for excilatory drugs. IC_{50} represents the dose or plasma concentration required for obtaining 50% of a maximum effect.

SUB-ACUTE TOXICITY STUDY IN WISTAR RATS TO EVALUATE TOXICITY PROFILE OF *MANDOORA VADAGAM*

Table :13. EFFECT OF SUB- ACUTE DOSE (28 DAYS)OF *MANDOORA VADAGAM ON* BODY WEIGHT IN GRAM

GROUP/DAYS	CONTROL	LOW 200mg/kg	MID 400mg/kg	HIGH 600mg/kg
1st day	116.3±1.03	119±1.543	118.3±2.231	120.3±2.23
7th day	126.3±1.03	125.3±1.343	125±2.113	131±2.11
14th day	128.1±1.004	96.3±1.12	96.4±2.012	97.4±2.012
21st day	97.3±2.120	104.2±1.501	98±1.131	99±1.13
28th day	107.3±1.041	106.3±1.202	137±2.0405	140±2.040

Values are expressed as mean ± SEM Statistical significance (p) calculated by one way ANOVA followed by Dunnett's(n=6); $^{ns}p>0.05$, *p<0.05, **p<0.01, ***p<0.001, calculated by comparing treated groupswith control group.



Interpretation

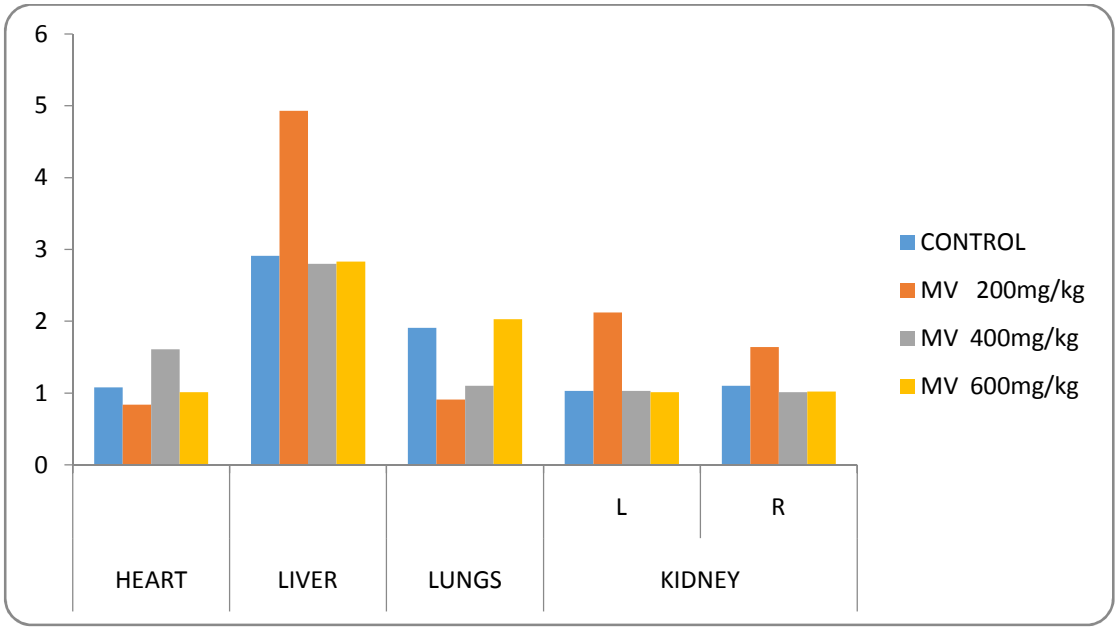
Results of body weight determination of animals from control and different dose groups exhibited comparable body weight gain throughout the dosing period of 28 days.

EFFECT OF SUBACUTE DOSE (28 DAYS) OF *MANDOORA VADAGAM*

Table : 14 *MANDOORA VADAGAM* ON ORGAN WEIGHT (PHYSICAL PARAMETER) IN GRAM ON ORGAN WEIGHT (PHYSICAL PARAMETER) IN GRAM

GROUP/ORGANS		CONTROL	LOW 200mg/kg	MID 400mg/kg	HIGH 600mg/kg
HEART		1.08±0.52	0.84±0.54	1.61±0.61	1.01±0.52
LIVER		2.91± 0.73	4.93±0.73	2.80±0.51	2.83± 0.73
LUNGS		1.91±0.60	0.91±0.64	1.10±0.74	2.03±0.60
KIDNEY	L	1.03±0.52	2.12±0.53	1.03±0.52	1.01±0.52
	R	1.1±0.524	1.64±0.52	1.01±0.524	1.02±0.024

Values are expressed as mean ± SEM Statistical significance (p) calculated by one way ANOVA followed by Dunnett's (n=6); $^{ns}p>0.05$, *p<0.05, **p<0.01, ***p<0.001, calculated by comparing treated groups with control group.



Interpretation

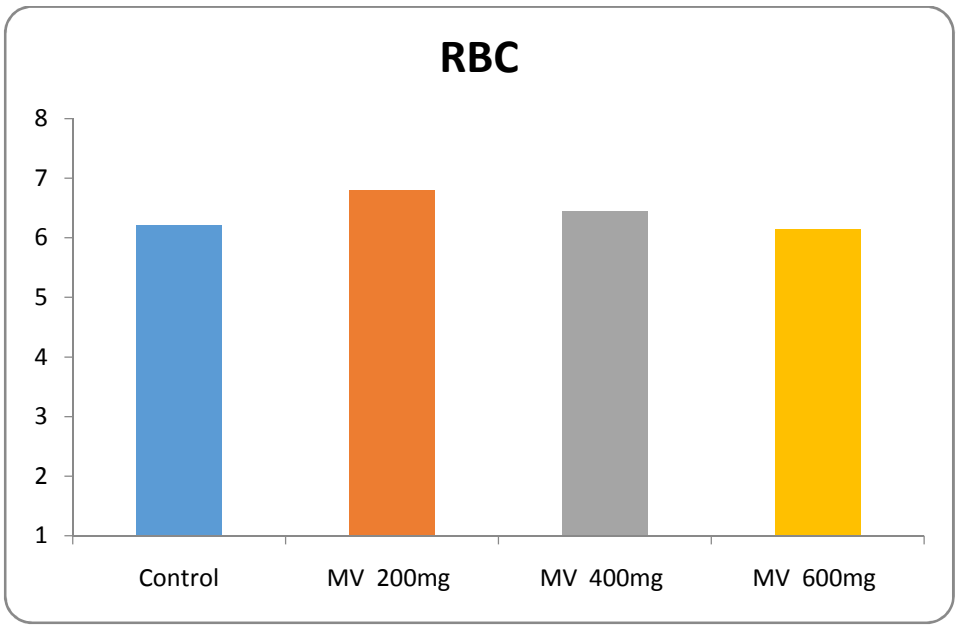
Group Mean Relative Organ Weights (% of body weight) are recorded in Table No.22 Comparison of organ weights of treated animals with respective control animals on day 29 was found to be comparable similarly.

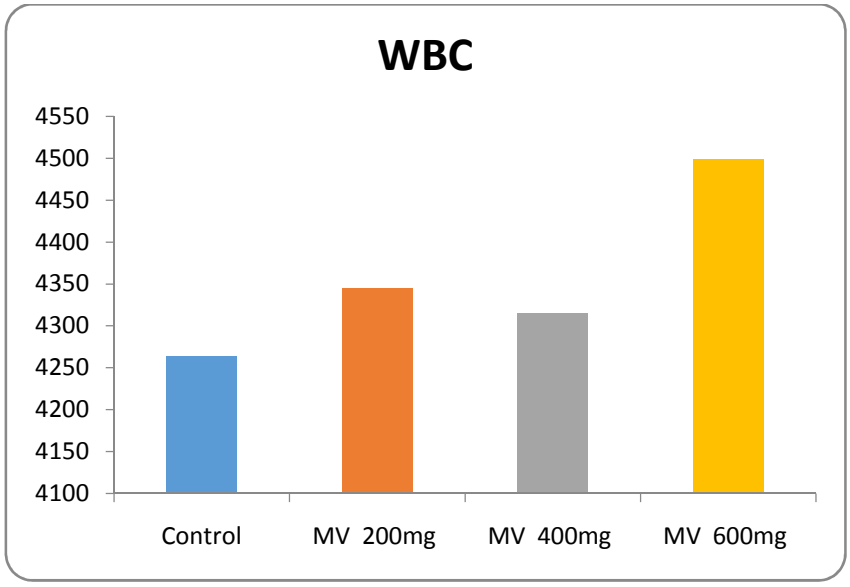
EFFECT OF SUB- ACUTE DOSE (28 DAYS) OF *MANDOORA VADAGAM* *ON* HAEMATOLOGICAL PARAMETERS

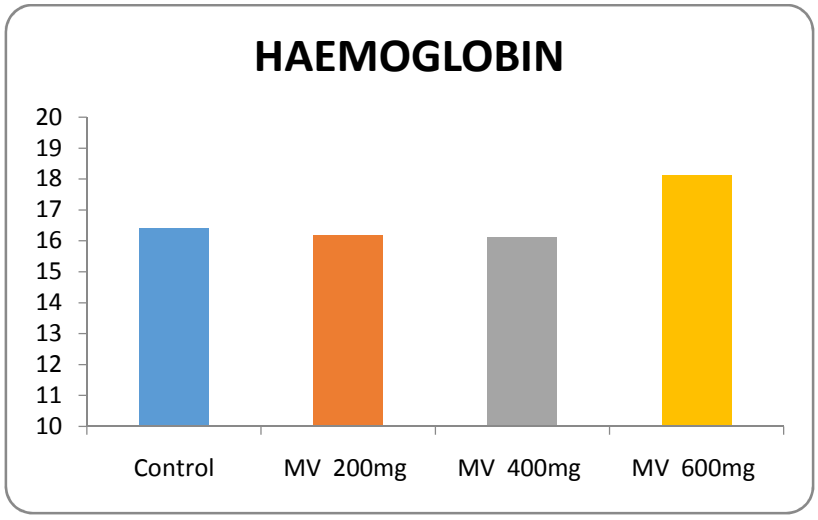
Table no 15

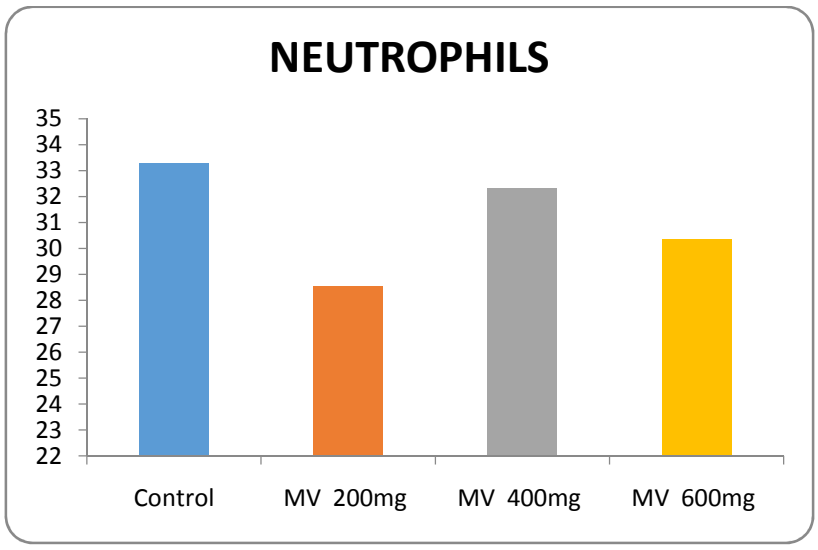
Drug dosage	RBC million cells/ cmm	WBC cells/ cmm	Haemo globin gm %	Differential count %			
				Neutophils	Eosinophils	Monocyte	Limpocyte
Control	6.21±0.50	4263.42±24.32	16.40±0.46	33.28±1.20	3.54±0.11	4.45±0.15	25.14±3.32
LOW 200 mg/kg	6.79±0.40	4345.05±24.22	16.20±0.44	28.56±1.41	4.11±0.14	5.12±0.30	25.23±3.51
MID 400mg/kg	6.44±0.32	4315.26±33.35	16.11±1.04	32.33±2.22	3.45±0.12	4.32±0.40	25.14±3.32
HIGH 600mg/kg	6.15±0.32	499.26±33.35	18.11±1.04	30.33±2.22	3.51±0.12	4.34±0.40	26.14±3.32

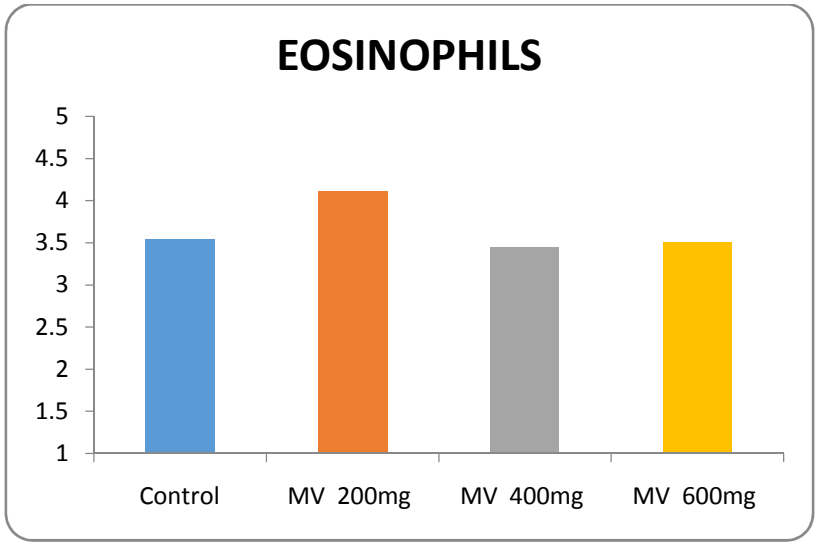
Values are expressed as mean ± SEM Statistical significance (p) calculated by one way ANOVA followed by Dunnett's(n=6); $^{ns}p>0.05$, *p<0.05, **p<0.01, ***p<0.001, calculated by comparing treated groups with control group.

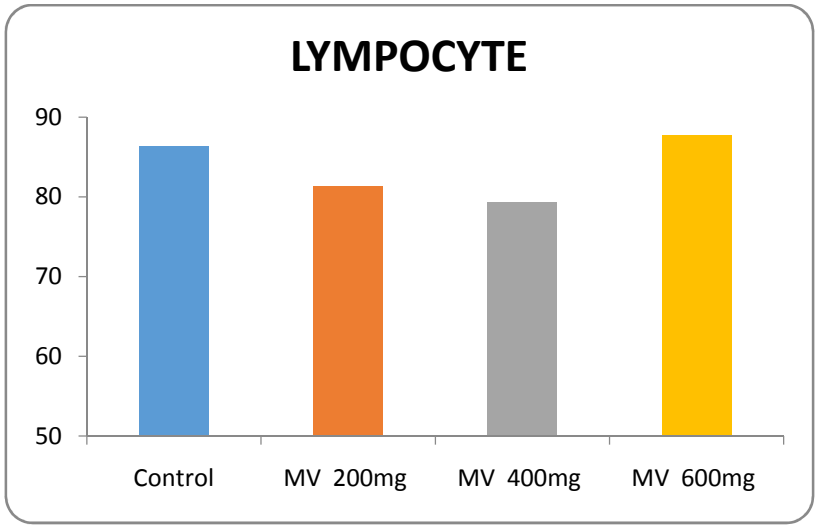



WBC
4550
4500
4450
4400
4350
4300
4250
4200
4150
4100
Control
MV 200mg
MV 400mg
MV 600mg


HAEMOGLOBIN
20
19
18
17
16
15
14
13
12
11
10
Control
MV 200mg
MV 400mg
MV 600mg


NEUTROPHILS
35
34
33
32
31
30
29
28
27
26
25
24
23
22
Control
MV 200mg
MV 400mg
MV 600mg



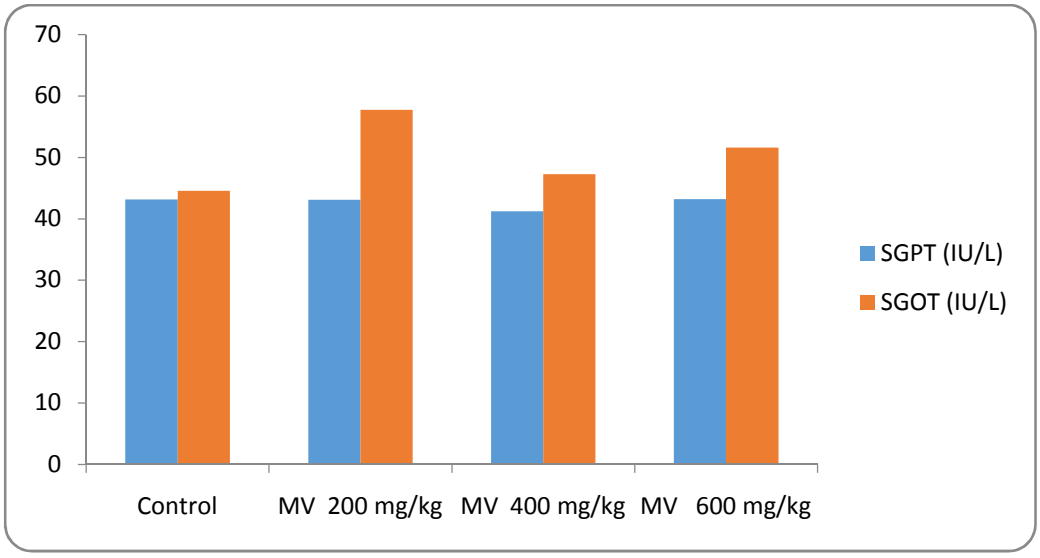


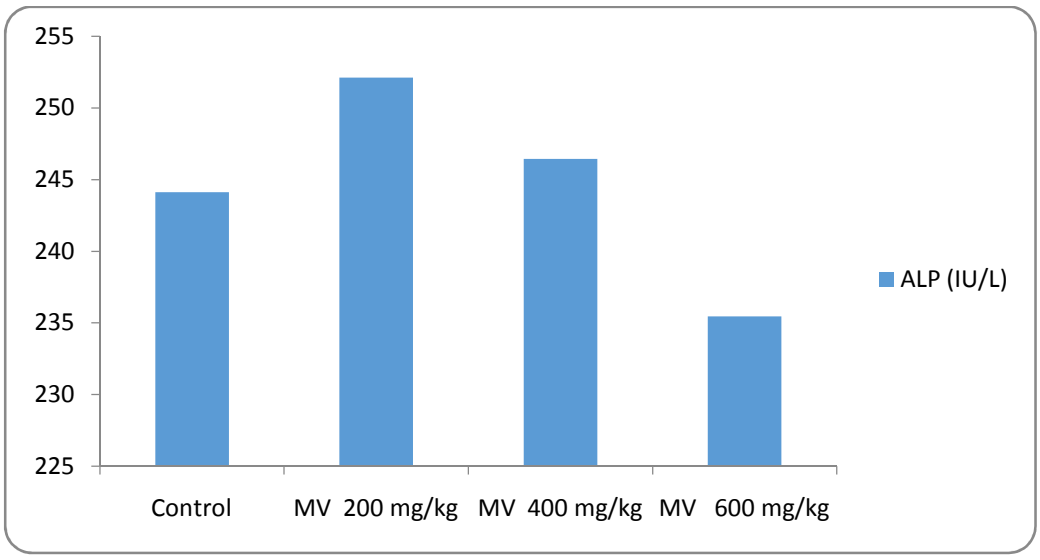
Interpretation

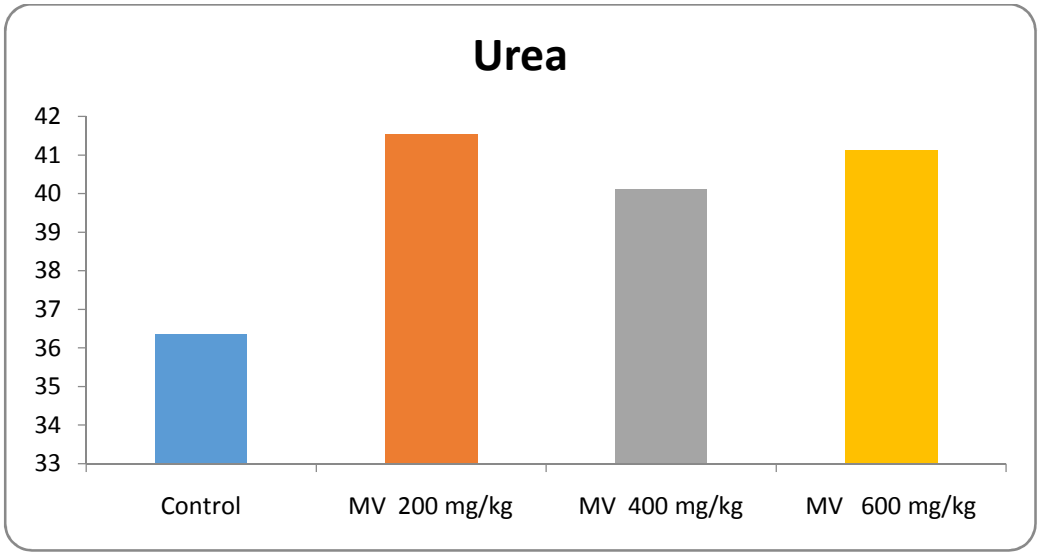
The results of hematological investigations conducted on day 29 revealed following significant changes in the values of different parameters investigated when compared with those of respective controls; however, the increase or decrease in the values obtained was within normal biological and laboratory limits or the effect was not dose dependent.

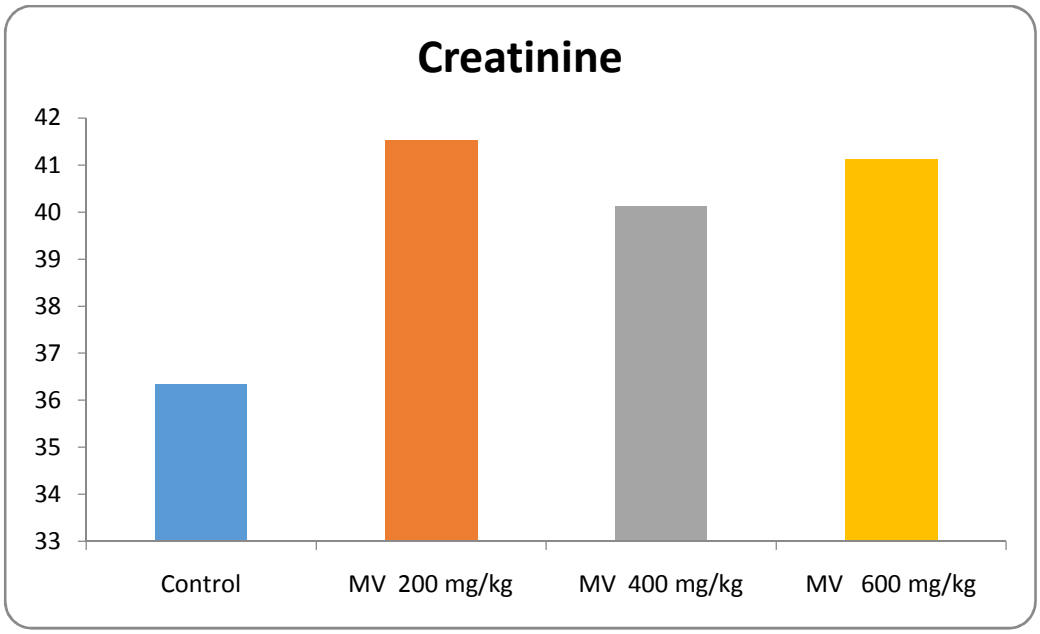
Table :16. EFFECT OF SUB- ACUTE DOSE(28 DAYS) OF *MANDOORA VADAGAM* ON BIOCHEMICAL PARAMETER

Drug Treatment	SGPT (IU/L)	SGOT (IU/L)	ALP (IU/L)	Urea (mg/dl)	Creatinine(mg/dl)
Control	43.14±3.02	143.24±4.31	244.12±11.32	36.35±3.00	0.64±0.03
LOW	43.13±3.22	142.23±4.01	252.11±12.42	41.53±2.42	0.60±0.04
MID	41.21±4.44	145.31±2.21	246.45±4.14	40.12±2.22	0.55±0.04
HIGH	43.21±4.44	141.31±2.21	235.45±4.14	41.12±2.22	0.56±0.04






Urea
42
41
40
39
38
37
36
35
34
33
Control
MV 200 mg/kg
MV 400 mg/kg
MV 600 mg/kg

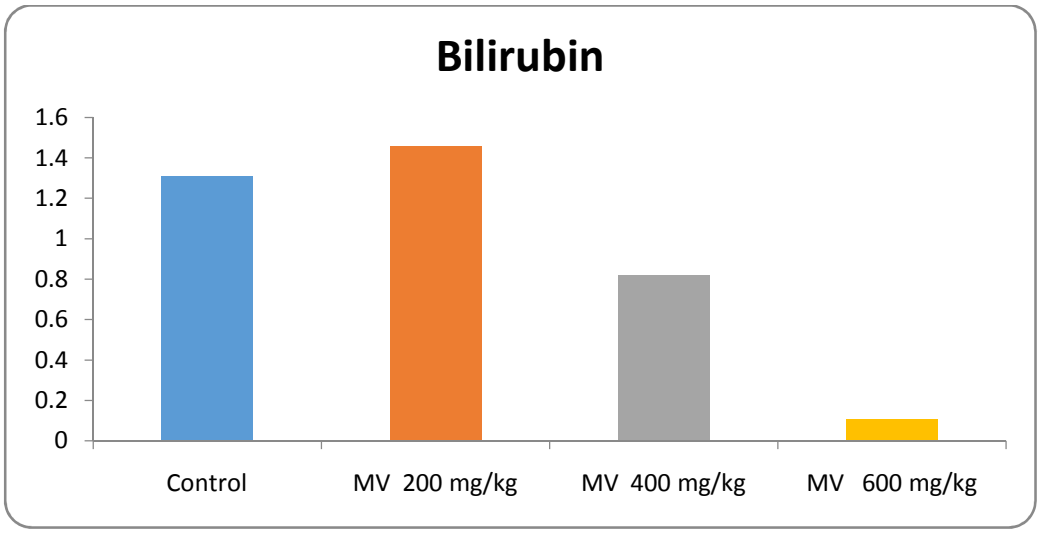

Creatinine
42
41
40
39
38
37
36
35
34
33
Control
MV 200 mg/kg
MV 400 mg/kg
MV 600 mg/kg

EFFECT OF SUB- ACUTE DOSE (28 DAYS) OF *MANDOORA VADAGAM*

BIOCHEMICAL PARAMETERS

GROUP	**CONTROL**	***M V*** **(200mg/kg)**	***M V*** **(400mg/kg)**	***M V*** **(600mg/kg)**
TOTAL BILIRUBIN (mg/dl)	1.308±0.2457	1.458±0.2827	0.8198±0.3376	0.104±0.199

Values are expressed as mean ± SEM Statisticalsignificance (p) calculated by one-way ANOVA followed by Dunnett's(n=6); $^{ns}p>0.05$, *p<0.05, **p<0.01, ***p<0.001, calculated by comparing treated groupswith control group.



Interpretation

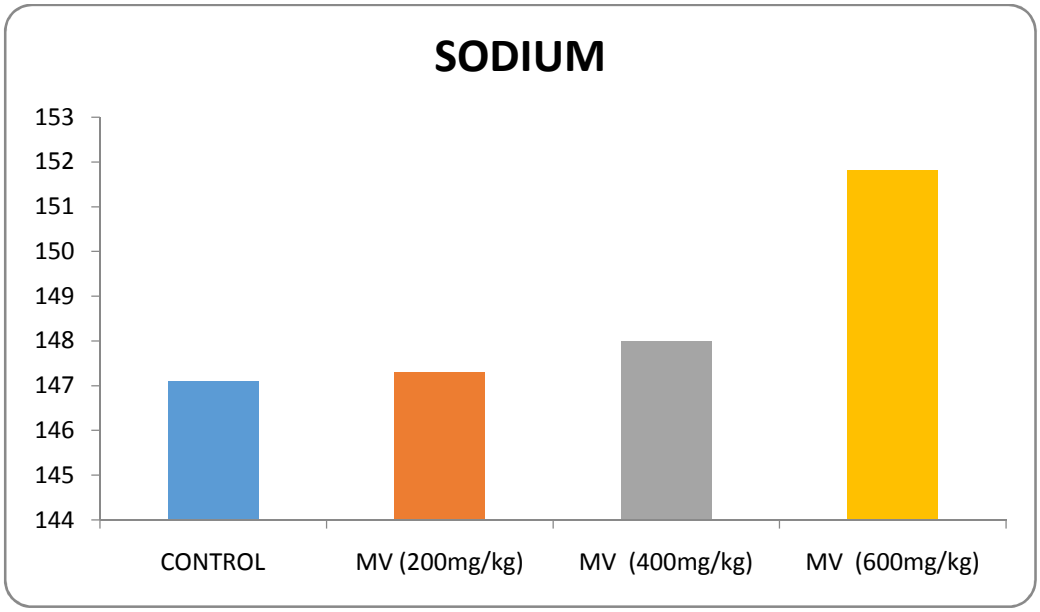
Results of Biochemical investigations conducted on the day 29th revealed the following significant changes in the values of hepatic serum enzymes studied. When compared with those of respective control. However, the increase or decrease in the values obtained was within normal biological and laboratory limits.

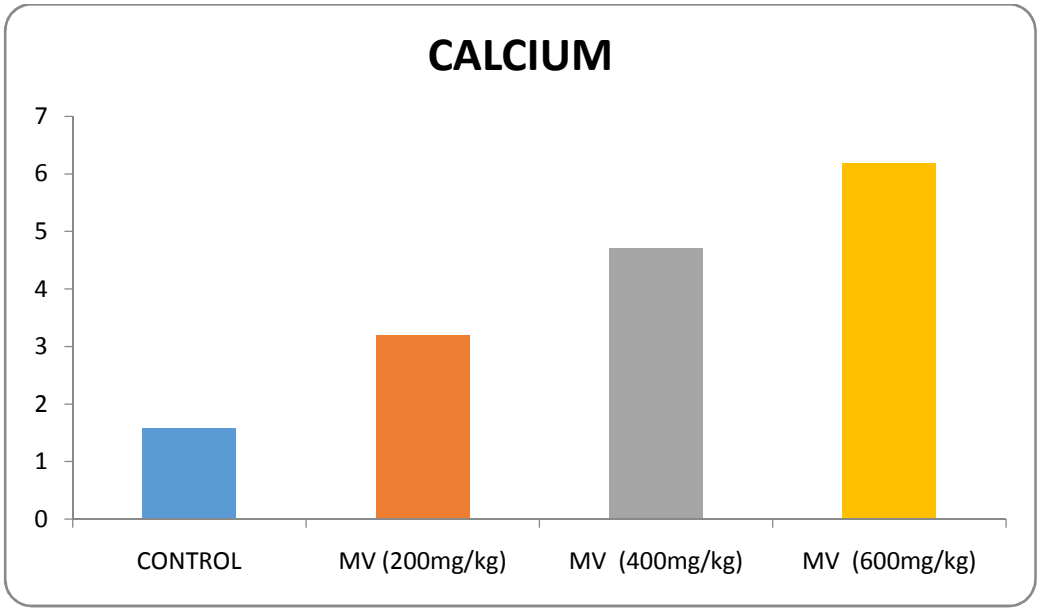
EFFECT OF SUB ACUTE DOSES (28 DAY) OF *MANDOORA VADAGAM* ON ELECTROLYTES: -

Table . No. 19

GROUP	CONTROL	*M V* (200mg/kg)	*M V* (400mg/kg)	*M V* (600mg/kg)
Sodium (mg/dl)	4.10±0.6855	4.30±0.6792	11±0.7571	11.80±0.70
Calcium (mg/dl)	1.580±0.137889	3.20±0.175783***	4.7±0.165299***	6.180±0.19611***
Phosphorus (U/L)	0.278±0.023017	0.3010±0.019915^{ns}	0.35630±0.035491^{ns}	5.037±0.32502*

Values are expressed as mean ± SEM Statisticalsignificance (p) calculated by one-way ANOVA followed by Dunnett's(n=6); NS- non-significant, *p<0.05, **p<0.01, ***p<0.001,




CALCIUM
7
6
5
4
3
2
1
0
CONTROL
MV (200mg/kg)
MV (400mg/kg)
MV (600mg/kg)

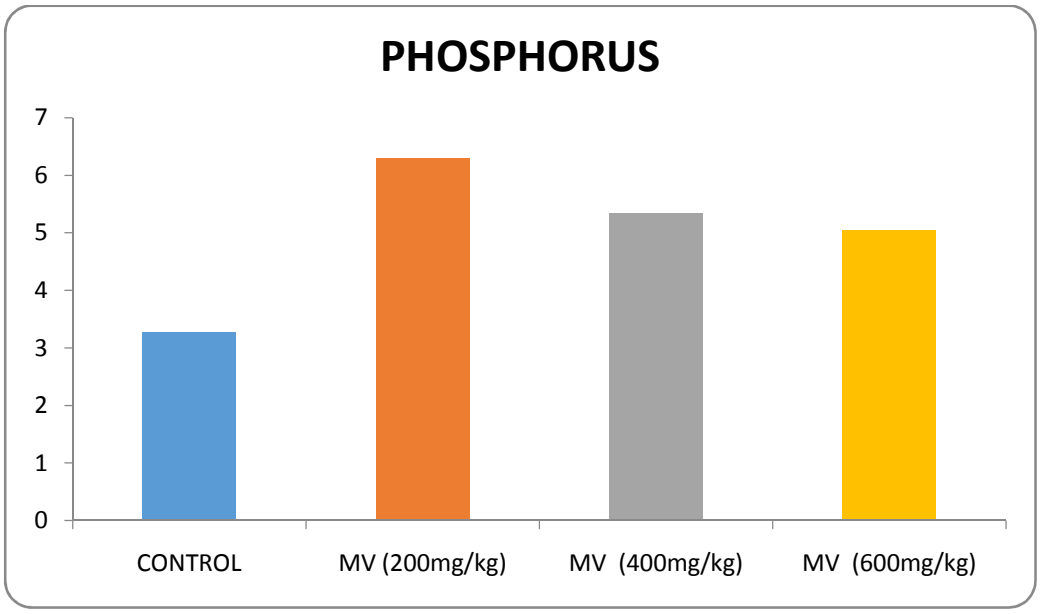
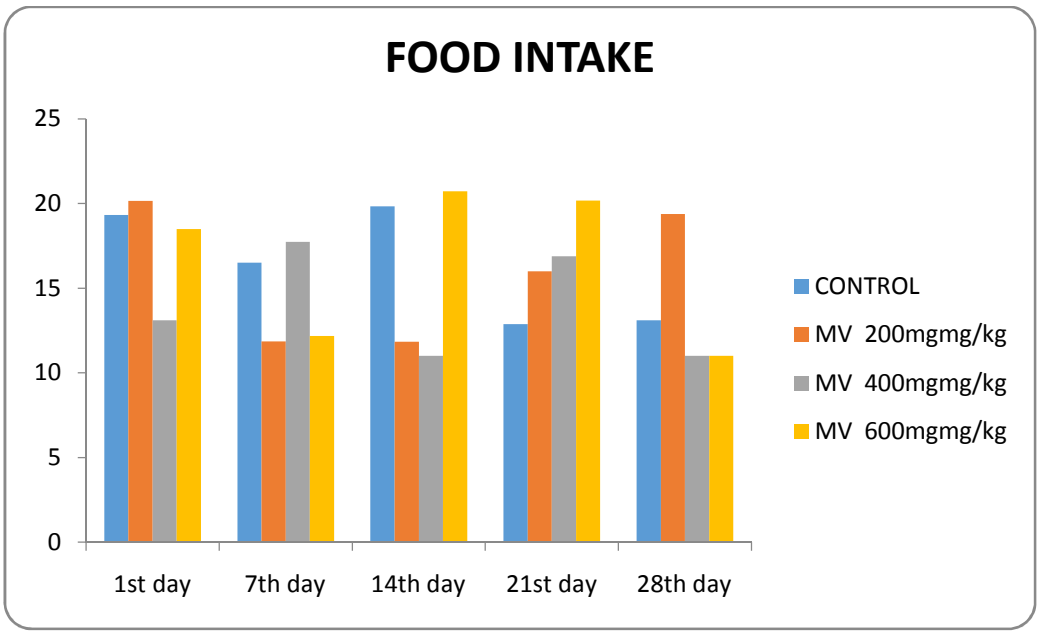

PHOSPHORUS
7
6
5
4
3
2
1
0
CONTROL
MV (200mg/kg)
MV (400mg/kg)
MV (600mg/kg)

Table:17 EFFECT OF SUB- ACUTE DOSE (28 DAYS) OF ON FOOD INTAKE IN GRAM

GROUP	CONTROL Distilled water	Low 200 mg/kg	Mid 400 mg/kg	high 600 mg/kg
1st DAY	19.33±13.5110	20.1672±14.3	13.10±21.71	18.5±7.62
7th DAY	16.5±11.	11.863±12.67	17.73±9.853	12.17±14.41
14th DAY	19.83±8.72	11.83±14.28	11±13.96	20.72±8.981
21st DAY	12.87±12.4	16±8.466	16.88±9.43	20.17±8.02
28th DAY	13.10±11.38	19.38±11.50	17±8.90	21±7.57

Values are expressed as mean ± SEM Statistical significance (p) calculated by one-way ANOVA followed by Dunnett's(n=6); $^{ns}p>0.05$, *p<0.05, **p<0.01, ***p<0.001, calculated by comparing treated groups with control group



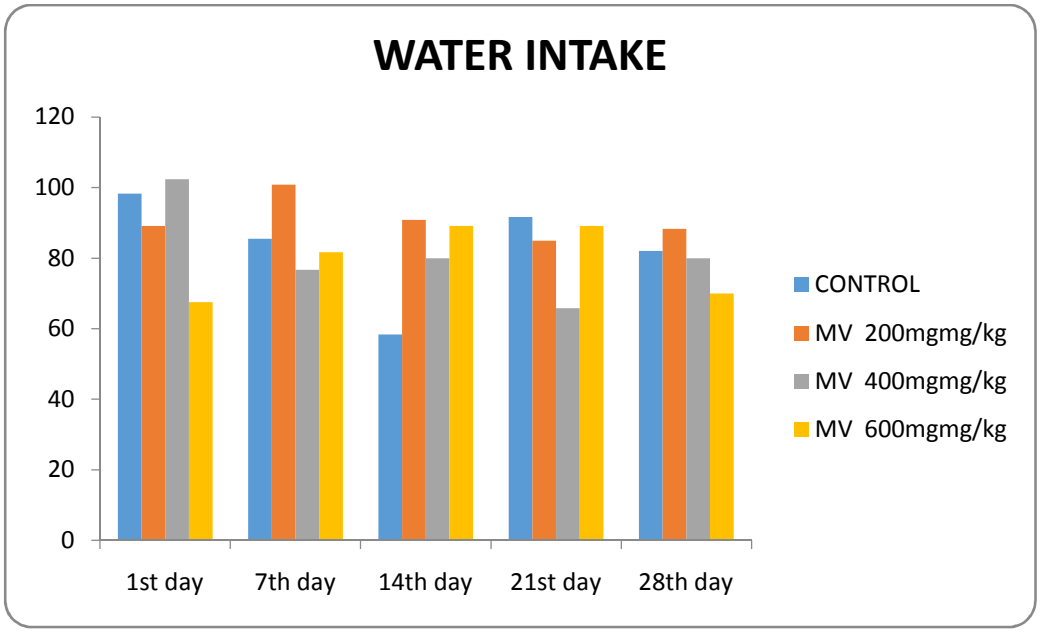
Interpretation

During dosing and the post-dosing recovery period, the quantity of food consumed by animals from different dose groups was found to be comparable with that by control animals.

Table:18. Effect of Sub- Acute Dose (28 Days) Of *MANDOORA VADAGAM* On Water Intake in ml

GROUP	CONTROL Distilled water	*M V* (200mg/kg)	*M V* (400mg/kg)	*M V* (600mg/kg)
1st DAY	98.3338±13.5110	89.1672±14.3426	102.10±21.7199	67.5±7.6203
7th DAY	85.5±11.7938	100.863±12.6770	76.6673±9.85363	81.6717±14.4150
14th DAY	58.3383±8.72817	90.8363±14.2812	80±13.9692	89.1672±8.88981
21st DAY	91.6687±12.4949	85±8.46662	65.8338±9.43550	89.1717±8.79602
28th DAY	82.10±11.3840	88.3348±11.5004	80±8.90061	70±7.57773

Values are expressed as mean ± SEM Statistical significance (p) calculated by one-way ANOVA followed by Dunnett's(n=6); $^{ns}p>0.05$, *p<0.05, **p<0.01, ***p<0.001, calculated by comparing treated groups with control group

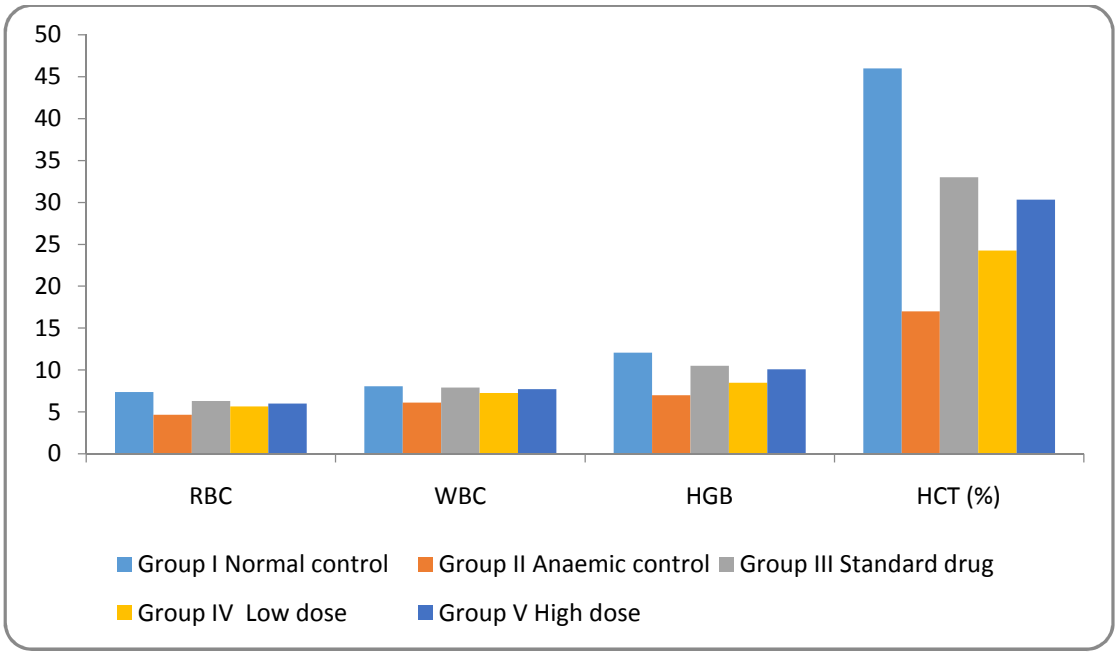


HEMATINIC ACTIVITY

Table . No. 20. Haematology Profile of Phenyl hydrazine induced Anaemic rats

Group	Treatment	RBC ($\times 10^6$ µl)	WBC ($\times 10^3$ µl)	HGB (g/dl)	HCT (%)
I Normal control	Normal saline (5ml/kg),p.o	7.37 ± 0.10	8.05±0.20	12.07±0.39	46±1.23
II Anaemic control	Phenylhydrazine (PHZ) 40 mg / kg ,i.p	4.67±0.43	6.13±0.13	7±0.16	17±0.17
III Standard drug	Haematinic syrup	6.3±0.10	7.9±0.20	10.50±0.39	33.0±0.23
IV Low dose	PHZ+ MV 200mg/kg, p.o	5.67± 0.10	7.27±0.13	8.47±0.13	24.24±0.85
V High dose	PHZ+ MV 400mg/kg, p.o	6±9.1	7.7±0.14	10.07±0.12	30.33±0.84

Fig. No.9. Haematology Profile of Phenyl hydrazine induced Anaemic rats



EFFECT OF *MV* ON HAEMATOLOGY PROFILE OF PHENYL HYDRAZINE INDUCED ANAEMIC RATS

The Mean Haemoglobin (Hb) content (g/dl) of rats belongs to disease Control group was decreased significantly 7±0.16 when compare to that of the Saline control group 12.07±0.39, which signifies the induction of Anaemia in Experimental animals. There was significant increase in Hb content were observed in animals treated with 200 and 400mg/kg of MV with 8.47±0.13 and 10.07±0.12 respectively. This observation reflects the promising Haematinic property of the trial drug MV in treated rats.

There was a significant decrease in the level of RBC(×10 6µl) were observed in animals belongs to group II 4.67±0.43when compare to that of the normal control rats with 7.37 ± 0.10. Treatment with MV at both the dose level shown marked increase in RBC level with 5.67± 0.10for MV 200mg/kg and 6±9.1for MV 400mg/kg. Similar results were observed with respect to WBC count.

The Haematocrit (HCT) test indicates the percentage of blood by volume that is composed of red blood cells. Treatment with PHZ shown significant decrease in HCT with the level of 17±0.17 lower when compare to control rats with HCT 46±1.23. Animals treated with 200 and 400mg/kg of MV has shown increased HCT value of 24.24±0.85and 30.33±0.84respectively.

EVALUATION OF HEPATOPROTECTIVE ACTIVITY OF *M V*

Table No.21 EFFECT OF ETHANOLIC EXTRACT OF M V ON SERUM ENZYMES

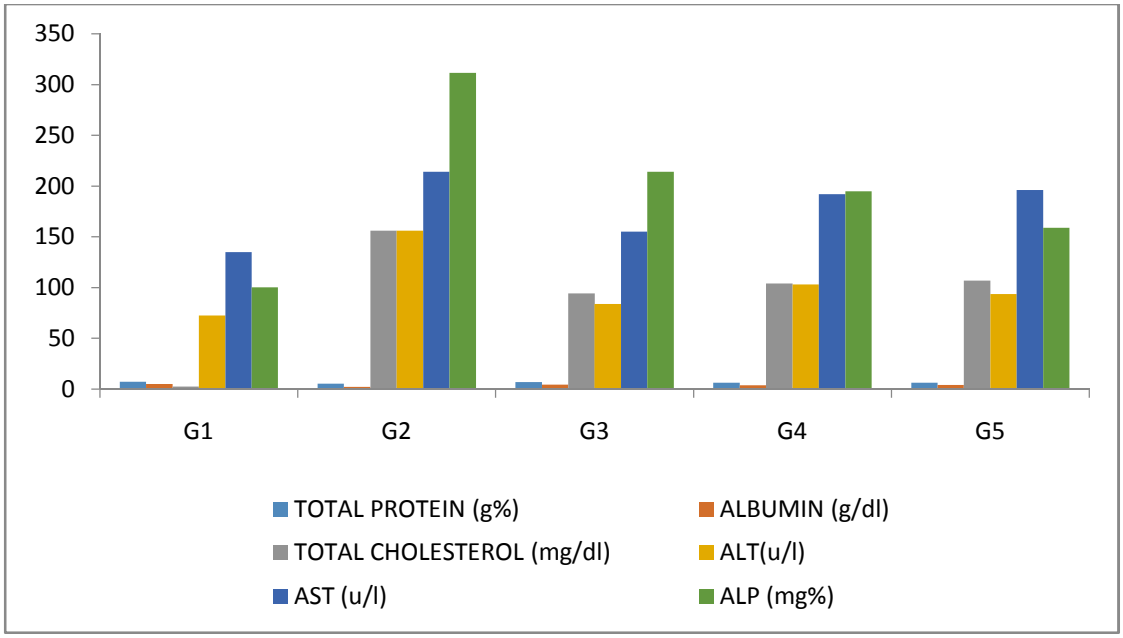
	TOTAL PROTEIN (g%)	ALBUMIN (g/dl)	TOTAL CHOLESTEROL (mg/dl)	ALT (u/l)	AST (u/l)	ALP (mg%)
G1 Normal control	7.14±0.47	4.91±0.35	2.61±4.39	72.38±3.50	135.07±4.40	100.39±4.02
G2 Disease control	5.24±0.20**a	2.12±0.2**a	156.11±8.17**a	156.14±8.88**a	214.23±8.69**a	311.59±6.49**a
G3 Standard control	6.84±0.75**b	4.34±0.34**b	94.43±6.09**b	84.03±5.82**b	155.08±6.53**b	213.96±5.42**b
G4 200 mg/kg	6.19±0.35*b	3.85±0.33**b	104.12±7.12**b	103.03±6.01**b	192.09±7.39**b	194.77±6.03**b
G5 400 mg/kg	6.32±0.45**b	4.18±0.37**b	107.04±5.01**b	93.61±5.70**b	196.16±9.41**b	158.89±6.75*b

**a-values are significantly different from control (G1) (P<0.001),

**b-values are significantly different from toxic control (G2) P<0.001

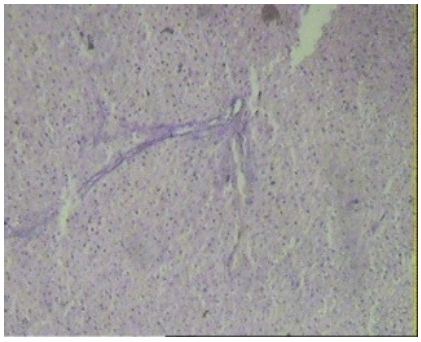
All values are found out by using one way ANOVA followed by Newman Keul's multiple range tests.

Fig. No. 10 Effect of Ethanolic Extract of *MANDOORA VADAGAM* on Serum Enzymes



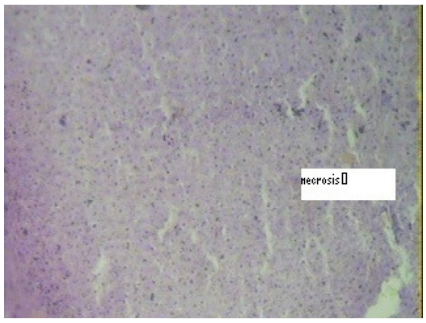
HISTOPATHOLOGY STUDY

Figure No: 11
Normal Control Rat



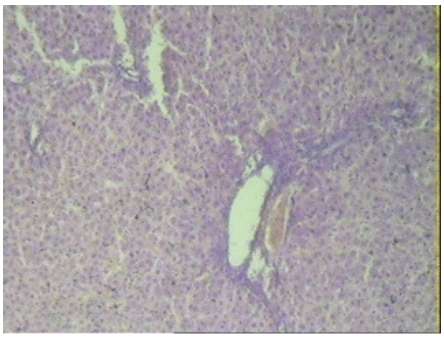
Section of liver parenchyma with hepatocyte which appear normal, and central vein & portal tract are normal.

Toxic Control



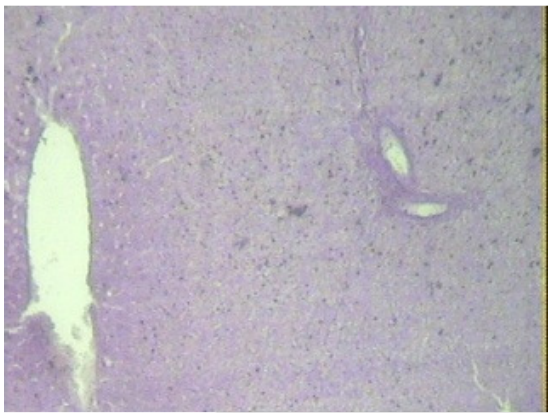
Section of liver parenchyma with scattered focal area of necrosis of hepatocyte.

Positive Control



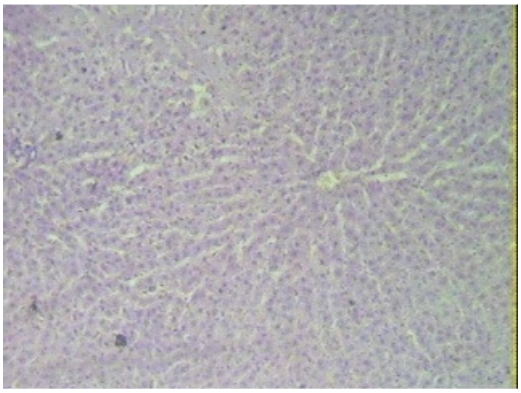
Section of liver parenchyma shows normal hepatic architecture

Treatment group (4) Rat



Section of liver parenchyma with minimal necrosis, and minimal inflammation

Treatment group (5) Rat



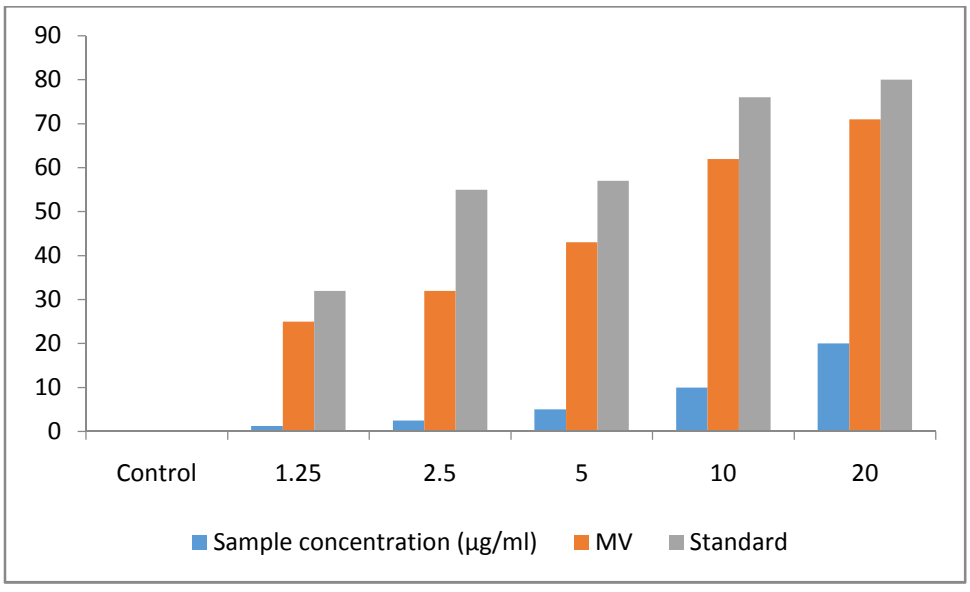
Section of liver parenchyma with hepatocyte which appear normal, and central vein & portal tract are normal.

EVALUATION OF ANTIOXIDANT ACTIVITY OF *MANDOORA VADAGAM* THROUGH DPPH (2, 2-DIPHENYL 1-2 PICRYLHYDRAZYL) ASSAY

Table No.22. Anti-oxidant activity of MANDOORA VADAGAM

Sample concentration Mandoora vadagam (µg/ml)	Absorbance		Percentage of Inhibition	
	MV	Standard Ascorpic acid (10mg/ml)	MV	Standard
Control	0.5321	0.384	-	-
1.25	0.4811	0.267	9.5%	32%
2.50	0.3945	0.172	32%	55%
5	0.2982	0.164	43%	57%
10	0.1980	0.092	62%	76%
20	0.1505	0.076	71%	80%

Table No.12. Anti-oxidant activity of MANDOORA VADAGAM



Interpretation

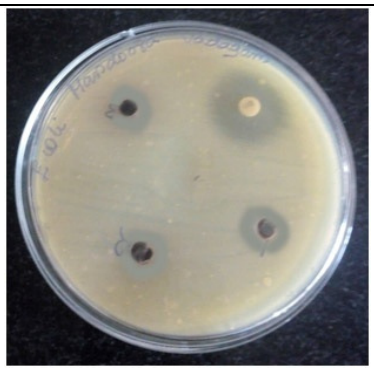
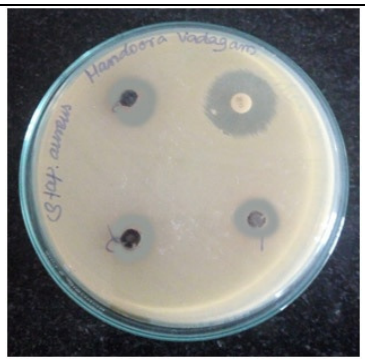
The trial drug 20 µg/ml Mandoora vadagam has significant anti oxidant property is compared with standard drug ascorbic acid.

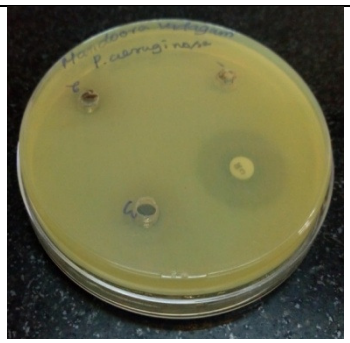
ANTIMICROBIAL ACTIVITY

Table 23. Antimicrobial Activities of Various Samples by Agar Well Diffusion Method

S.No.	Test Pathogens	Result	Zone of Inhibition (mm) at 30µl	
			Positive Control Chloromphenical	**Size of Inhibition**
1.	*Escherichia coli*	Sensitive	25 mm	20 mm
2	*Klebsiella pneumoniae*	Sensitive	20 mm	10 mm
3	*Staphylococcus aureus*	Sensitive	20 mm	10 mm
4	*Pseudomonas aeruginosa*	Resistant	23 mm	5 mm
5.	*Candida Sp*	Sensitive	24 mm *(Ketaconozole)*	8 mm

Figure. No. 13. Microbiology result

S.No.	Bacterial Pathogens	Plates
1.	*Escherichia coli*	
2.	*Staphylococcu aureus*	

3.	*Klebsiella sps.*	
4.	*Pseudomonas aeruginosa*	
5.	*Candida sp*	

Interpretation :

Both gram positive, gram negative bacteria E.Coli, Klebsiella, Pneumonia and Staphylococcus aureus and fungus Candida species were found to be sensitive when compared to the standard drug Chloromphenical and Ketaconozole. The bacteria Pseudomona aeruginosa were found to be resistance. The mineral drug **Mandoora Vadagam** exhibited broad spectrum activity against bacterial and fungal pathogenes at 1 mg/ml concentration of the drug.

7. SUMMARY

1. In siddha system of medicine, siddhars told that the human beings are affected by 4448 diseases. In it paandu is a more prevalent which affect the people in all age groups.
2. In the text book "*Noi nadal noi mudhal nadal*" authoured by Dr.M. Shunmuga Velu HPIM. It is explained that the symptoms are *udalveluthal* (Pallor skin), s*iru tholaivu nadakinum kaal ointhupothal* (Fatigue during walking), *perumoochu* (Dyspnoea), *thalaisutral* (Dizziness), *marbuthudithal* (Palpitation), *udalelaithal* (Weight loss).
3. In modern term, anaemia may be defined as a decrease in the total amount of red blood cells or hemoglobin in the blood. The symptoms are pallor, dizziness, shortness of breath, palpitation, easily fatigue and loss of energy.
4. In modern science the symptoms of *Paandu* may be correlated with Anaemia. In the literature of *SARABENTHIRA VAITHIYA MURAIGAL(pandu kamalai sikichai)* there is a preparation called *Mandoora vadagam* which is exclusively indicated for anaemia.
5. The ingredients Mandooram and Indhuppu were purchased from shop in Nagercoil, Kanyakumari District. The other raw drugs were purchased from raw drugs shop in Tirunelveli Town.
6. The ingredients of the trial drug are identified and authenticated by the experts of Gunapadam department.
7. Review of the literatures and lateral research work reveals that ingredients MV used in treating anaemia.
8. All drug are purified as said in siddha literature. The trial drug MV was prepared according to the siddha classical literature.
9. When the pills are quite large, say as much as 1gm in weight they are often called as vadagam. The shelf life is 1 year.
10. Vadagam can be administer oraly with suitable adjuvant or chewing.
11. The Mandoora vadagam subjected to various standardization method. Viz physical analysis, physico chemical analysis, phyto chemical analysis and Instrumental analysis.
12. Physical analysis reveals that the trial drug is black in colour and it has pungent odour, round in appearance. It is hard to touch and it has astringent

and sour taste. In anaemia the pitha humour is deranged and the physical constituent blood is decreased. The astrigent taste normalised the pitha humour and purifies the blood. Pungent taste increased the appetite. The loss on drying of Trial drug is in acceptable orange, which deonates stability of the trial drug. There is no microbial contamination in the trial drug.

13. The chemical analysis shows the trial drug contains calcium, sulphate, ferrous iron, unsaturated compound and amino acids.
14. SEM analysis shows the particle size is 5-10µm. So the trial drug will be easily absorbed in intestine.
15. FTIR result shows the trial drug contains amines, alkaline and aromatics
    a. Amines : Acts as a neuro transmitter. Involved in protein synthesis. Amines play an important role in reducing abdominal pain, bloating
    b. Alkanes : They protect against bacterial and fungal infections.
    c. Aromatics : These herbs have stron and often pleasant odour. This oil-based aroma can stimulate the relax the body via the digestive and nervous system and are the basis for much of aromatherapy.
16. ICP-OES studies reveals that heavy metals such as aluminium, arsenic, cadmium, copper, mercury, nickal, lead are with in below detecting in level it shows the safety of the trial drug and also contain essential elements such as Calcium, iron, pottasium, Magnesium, sodium, phosphorus

Calcium:

Calcium along with phosphate is required for the formation (of hydroxyapatite) and physical strenth of skeletal tissue.

Bones which are in a dynamic state serve as reservoir of cell.

Muscle contraction: Ca^{2+} interacts with troponin C to trigger muscle contraction. Calcium also activates ATP ase, increases the interaction between actin and myosin.

Nerve transmission: Ca^{2+} is necessary for the transmission of nerve impulse.

Activation of enzymes: Ca^{2+} is needed for the direct activation of enzymes such as lipase, ATP ase and succinate dehydrogenase.

Ferrous iron :

Iron is used for synthesis of hemoglobin.

Ferrous form is soluble and readily absorbed through intestine.

In iron deficiency anaemia Fe absorption is increased to 2-10 times that of normal.

Potassium :

Potassium maintain intracellular osmotic pressure

It is required for the regulation of acid-base balance and water balance in the cells.

The enzyme pyruvate kinase is dependent on K^+ for optimal activity.

Pottasium is required for the transmission of nerve impulse.

Adequate intracellular concentration K^+ is necessary for proper biosynthesis of proteins by ribosomes.

Magnesium :

Magnesium is required for the formation of bones and teeth.

Mg^{2+} serve as a cofactor for several enzymes requiring ATP e.g. hexokinase, glucokinase, phosphofructo kinase, adenylate cyclase.

Mg^{2+} is necessary for proper neuro muscular function. Low Mg^{2+} levels lead to neuromuscular irritability.

Sodium :

Sodium is an electrolyte that helps regulate the movement of water throughout the body. It also maintains the blood pressure and nerve and muscle function.

Phosphorus :

It plays a central role for the formation and utilization of high-energy phosphate compounds e.g. ATP, GTP, creatine phosphate etc.

Phosphorus is required for the formation of phospholipids, phospho proteins and nucleic acids (DNA & RNA)

17. In pharmacological studies the trial drug Mandoora vadagam has significant haematinic activity and also it has significant hepato protective activity and anti oxidant properties. So it can be used for Paandu.
18. Both Gram positive and Gram negative bacteria *E.coli, Klebsiella pneumoniae* and *Staphylococcus aureus, Pseudomonas aeruginosa and Salmonella typhi* were found to be sensitive when compared to the standard drug Gentamycin

(Broad spectrum).The herbal drug *Mandoora vadagam* exhibited broad spectrum antibacterial activity against bacterial pathogens at 100mg / ml concentration of the drug.

19. The acute toxicity study shows that *Mandoora vadagam* did not produce any toxic effect at dose of 5mg/kg, 50mg/kg, 300mg/kg, 1000mg/kg and 2000 mg/kg to rats. So No-Observed-Adverse-Effect-Level (NOAEL) of *Mandoora vadagam* at dose of 2000 mg/kg. In sub acute toxicity study test drug *Mandoora vadagam* can be considered as safe, as it did not cause either any lethality or adverse changes with general behaviour of rats and also there were no observable detrimental effects (200 to 600 mg/kg body weight) over a period of 28 days. Our results have demonstrated that the *Mandoora vadagam* is relatively safe when administered orally in rats.
20. Finally all the parameters and histopathological studies results revealed the drug was safe in rats. Acute and subacute toxicity study of MV represents non toxic and safe drug in wistar albino rats. Biochemical and histopathological results concluded that the dose level of 798 mg mentioned in the siddha literature “Sarabendirar vaithiya muraigal (Paandu kamalai sikichai)” is the safety dose for human consumption .The test drug of Mandoora Vadagam can be human trials hopefully.

8. CONCLUSION

The trial drug *Mandoora Vadagam* is a herbo mineral, selected from the text book of *Sarabendirar Vaithiya Muraigal (Pandu Kamalai Sikitchai)* published by K.Vasudeva Sasthiri,B.A., S.Venkatrajan, L.I.M., (Page No. 58) for Haematinic, Hepatoprotective, Antioxidant Activities and the results supported the study.

From the literature review, physico-chemical analysis, Bio-Chemical analysis, Pharamacological studies, Microbiological analysis, Instrumental analysis and toxicological studies it is concluded that the test drug of MV is safe and effective for Anaemia and in safer to continue even for a long duration.

9. FUTURE SCOPE

Preclinical evaluation of the test drug Mandoora Vadagam has been done by bio-chemical, physio-chemical, instrumental, pharmacological, toxicological procedures. This Mandoora Vadagam has been used very much to treating anaemia.

Having made up of micro particles, Mandoora Vadagam holds extra ordinary promise for the presentation and treatment of Anaemia. In future the drug has to validated by extensive clinical trials as per WHO guidelines.

10. BIBILIOGRAPHY

1. BenoistB, McLeanE, CogswellM, Egli I, WojdylaD. Worldwide prevalence ofanaemia1993–2005.WHOGlobalDatabaseonAnaemia. Geneva,Switzerland:WorldHealthOrganization;2008.
2. Bishen Singh.Mahendra pal singh art by Purushotham koushik Medicinal plants and raw drugs of Indian.
3. Davidson's Principles and practice of medicine.10th editon,2002, elseiver science,Ltd.
4. Dr. Arangarajan S. art by a Agathiar attavanai vakadam published by saraswathi mahal noolagam , Tanjore.
5. Dr. Nadkarni. K.M. art by Indian Materia medica vol –I & II.
6. Dr. Somasundaram.S., taxonomy of angiosperms medicinal part-part 2,4th edition , elankovan pathipagam.
7. Dr.U.Sathyanarayana, M.Sc., Ph.D., F.I.C., F.A.C.B., & Dr. U, Chakrapani, Text book of Biochemistry.
8. Dr.Thiyagarajan.R. art by Gunapadam thathu jeeva vaguppu.
9. EBBING General chemistry 3rd edition.
10. Edward salis bury Dana,A.Text book of minerology 4th edition published by CBC Publishers,11 Darya Ganj.New Delhi-110002.
11. Gupta. A.K., Madhu sharma, Indian Medicinal Plants, Vol-V ,2007 edition, Mehta offset, New Delhi.
12. Indian journal of traditional knowledge vol 11.jan (2012)
13. International journal of food sciences & nutrition .vol 56,2005.Antioxidant efficacy of blackpepperand piperine in rats with high fat diet induced oxidative stress.
14. Journal of traditional medicine & clinical naturopathy .july 29, 2014
15. Kannusamy pillai art by Kannusamy paramparai vaidhiyam published by B.Rathna nayakar & sons, Chennai-79.
16. Kuppusamy muthaliar K.N.& Dr. Uthamarayan K.S. art by Siddha vaithiya thirattu, published by Indian medicine & homeopathy, Chennai-106,1st edition-1993

17. Murugesa Mudhaliyar. K.S., Gunapadam siddha Mooligai Vaguppu-I part ,3rd edition published by Indian medicine & homeopathy, Chennai.
18. Naidu. G.D., published by The Pharmacoepoeia of Siddha research Medicines 7th edition.
19. National strategies for prevention and control of micronutrient malnutrition. geneva,WorldHealth Organization, (WHA45/1992/REC/1);1992.
20. OECD test guideline 423, OECD guideline for testing of chemicals. Available :[http://www.oecd.org/document/html],2001
21. Rabindranath Practical approach to crystallography and mineralogy.
22. Ramachandran S.P. art by Anuboga vaidhiya bramma ragasiyam part I, published by thamarai noolagam, Chennai-106, 1st edition –october 2000
23. Ramachandran S.P. art by Sirorathina vaidhiya boosanam edited 2nd edition November 1996.
24. Ramachandran S.P.art by Uyirkakkum siddha maruthuvam (aathmarasha mirtham ennum vaidhiya sarasangiram), published by thamarai noolagam, Chennai-106, 1st edition – october 2000.
25. Ramachandran S.P.art by Pathartha guna chinthamani, published by thamarai noolagam, Chennai-106, 1st edition –october 2000.
26. Sambasivam Pillai.T.V., Agarathy published by Directorate of Indian medicine and homeopathy,Chennai.
27. Sarakku suddhi muraikal, 1stedition 2008 published by siddha maruthuva nool veliyeetu pirivu, Indian medicine and homeopathy department,Chennai.
28. Seetharam prasath. J. art by Anubava vaithiya deva ragasiyam.
29. Shanmugavelu M., Noigaluku Siddha Parigaram Part 2,Third edition 1999,Dept.of Indian medicine &Homeopathy,Chennai-106.
30. Siddha formulary of india- part I,department of Indian medicine and homeopathy.
31. Sornamariyammal. I. Bogar 7000.l sitha maruthuva kanimangal.
32. The wealth of india volII B (A dictionary of Indian raw materials and industrials products), 1 st edition , publications and information directorate, CSIR, Chennai.
33. Vasudeva Sasthiri.K., B.A., Venkatrajan, L.I.M., art by Sarabendirar Vaithiya Muraigal (Pandu Kamalai Sikitchai) (p.no :58).
34. www. Researchgate.net /publication /41804993.